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West and North Elevation, House of E. A. Choate, Esq., Rye, N. Y.

MAKING THE HOUSE FIT ITS SITE

BY W. K. RAINSFORD, Architect

THE house of E. A. Choate, Esq., stands in the grounds of the Apawamis Club at Rye, and upon the edge of the Golf Course. The situation was beautiful, the topography very "accidenté," and in the planning and massing of the house, the problem was one of a close study of natural conditions, unhampered by preconceived and ill-digested convictions on the part of the clients.

The curve of a rocky ledge, trailing off into a fine grove of oak trees, seemed pre-eminently the proper site, and suggested that the backbone of the house should bend at an obtuse angle. The fact that the view lay to the N.N.W., suggested that the Living Room, to get both view and sun, should open through in both directions, and probably had better open in three. To get an East window in the Dining Room, and in some bedroom above it, another angle would have to be found, but the bend of the backbone would make this not difficult. The character of the ground suggested a style somewhat rugged, and in which beauty should be sought through the medium of color and texture rather than of detail. And lastly, to avoid too much theorizing, the fact that the house would be equally well seen from each of three directions, but always at some distance and through trees, and that the approach would encompass it in this way, suggested a strong featuring of the roof, and a massing of it for effect of climax. Actually, the roof line, more than anything else, determined the final silhouette of the plan.

The study of the ground plans was not difficult. In the use of a naturalesque style an architect must trust his own good taste and follow the line of least resistance. Changes of level were used wherever convenient, and some exterior grading was necessary. That the garage doors should be visible, though not conspicuous, from the front door was not considered a serious fault, more especially since the amount of grading necessary to have avoided this would have been large, and the more circuitous driveway would have very seriously damaged the intimate beauty of the oak grove. It was found practical to open the

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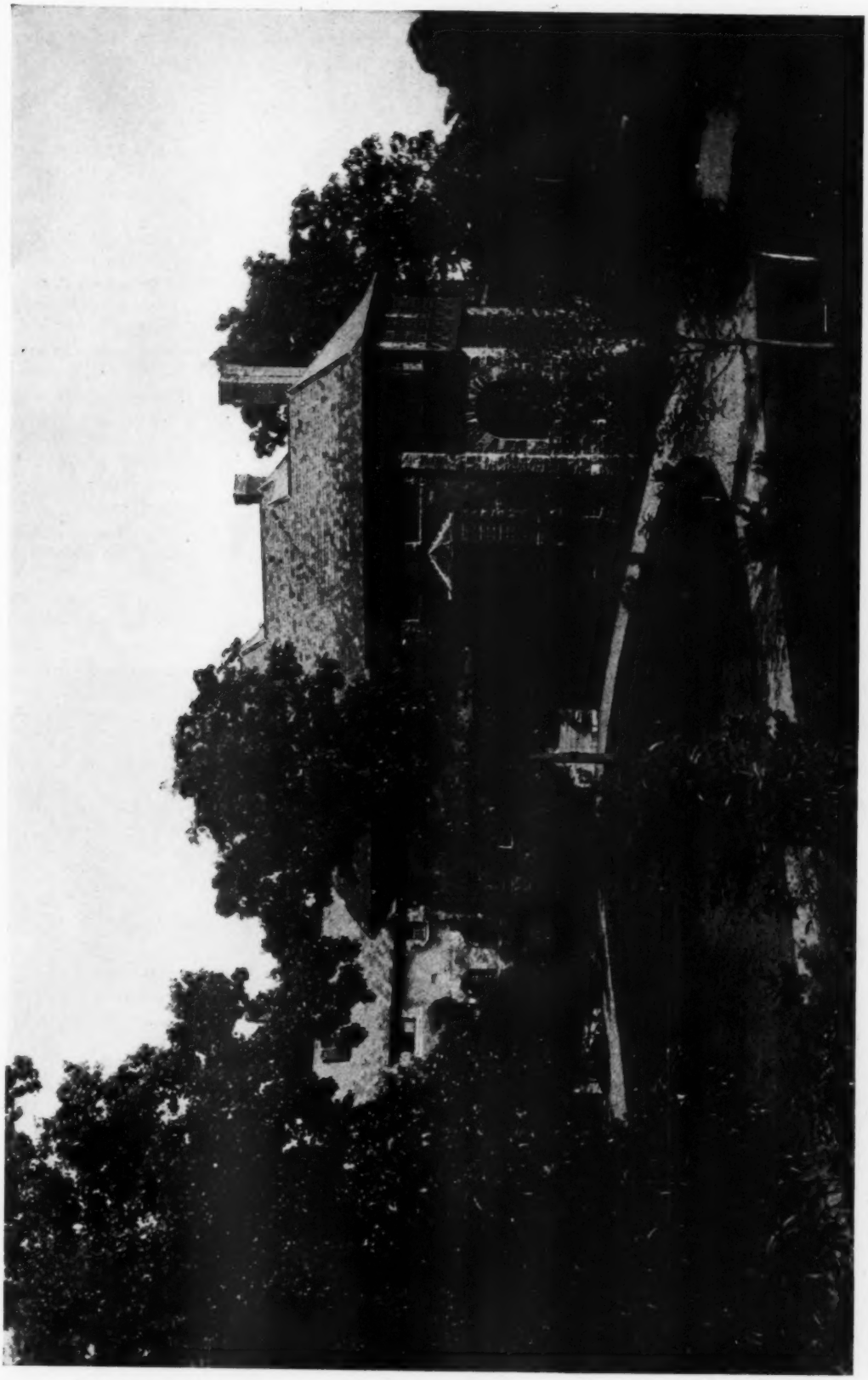
kitchen through in both directions—a fact which has enabled it to be kept cool throughout the hottest summer weather. Since the sleeping porch was, of necessity, to be placed above the sun parlor, their location was determined by that one of the two which was judged the more important, and the morning sun was sacrificed for sunset and view.

Fireplace in Stair Hall

Of the North and West elevations, the same may be said, as of the plans. When in the middle of the Nineteenth Century the informal Jardin Anglais was sweeping away the beautiful formal gardens of Europe, and conscious thought in design was considered original sin, a formula once offered by an expert for the laying out of a garden was *"Enivrez le jardinier, et suivez dans ses pas."*—(Get the gardener very drunk, and follow in his footsteps.) This is perhaps not a final solution, but the gist of it is a frank expression of impulse and of fact. Here a frank expression of plan was all that was necessary for a good elevation, the massing of the roof, as has been said, having already been closely considered in the proportioning of the somewhat complicated silhouette. The sleeping porch, which, though so necessary a feature in nearly all modern country residences, is so often an afterthought in design, and which does not so much confess its accidental origin as it does proclaim it from the house tops,—the sleeping porch was made the one dominant feature of the short West front. By allowing it slightly to overlap its supporting walls, and providing it with the only completed triangle in all the complex series of hipped roofs, it was rescued beyond peradventure from any accusation of the accidental.

Living Room



NORTH ELEVATION

HOUSE OF E. A. CHOATE, ESQ., RYE, N. Y.

W. K. RAINSFORD, ARCHITECT

The South front was decidedly more difficult. Here, beyond finding a sufficiently recessed angle for the little sunken garden, whose lily-pool should be on axis with the Living Room, and slightly featuring the chimney of the Hall fireplace which would dominate that garden, the central block of the building alone had to be considered.

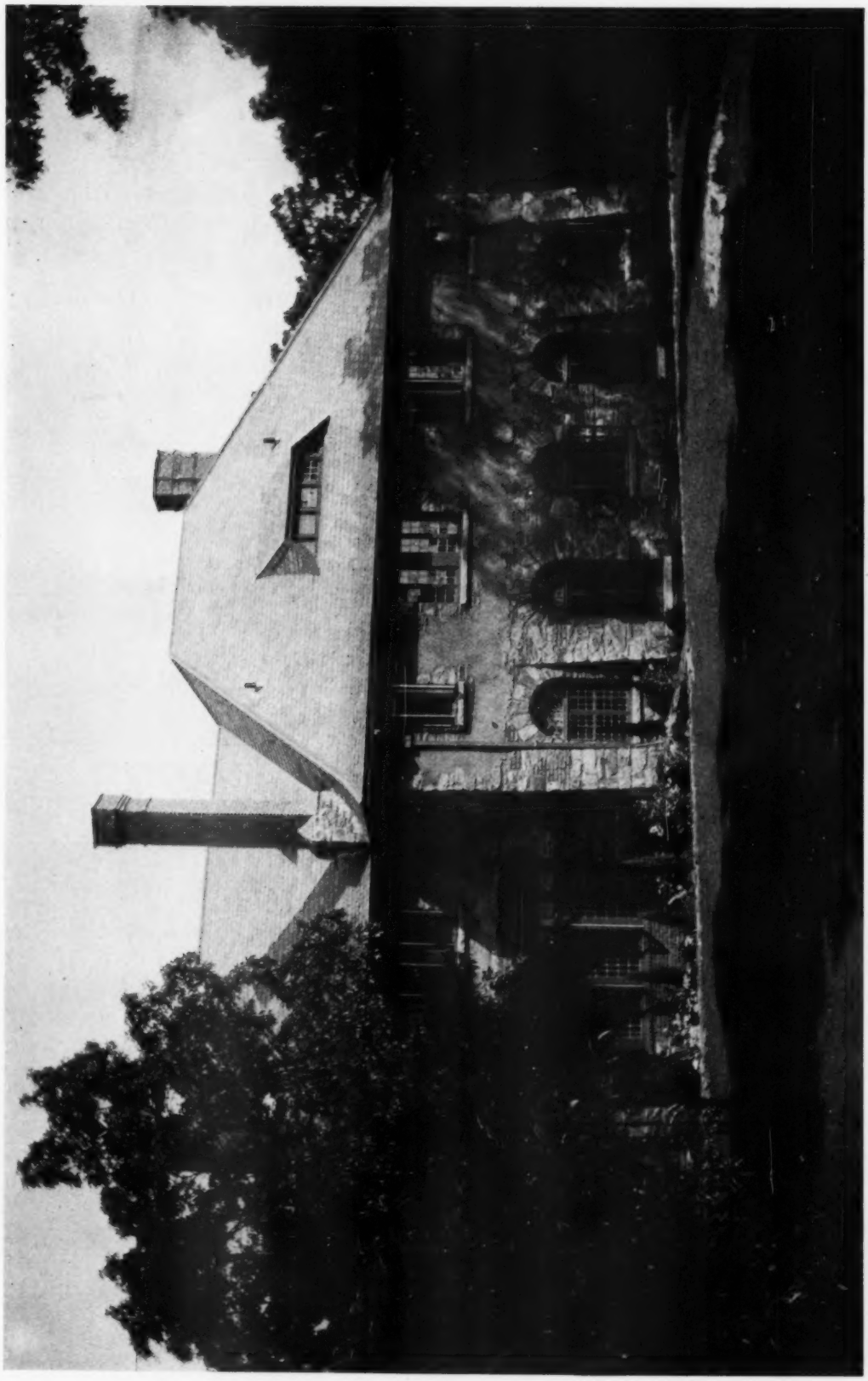
Corner of Garden

But this central block was a problem. The Jardinier, instead of wandering amiably onward upon his inspired path, sat down and went to sleep. The block was profiled from ridge to foundation at either end; its lower floor, occupied by Dining Room and Hall, was in plan a composition of two-one from right to left, while the upper floor was two-one two-one. No frank treatment of such an aggregation could be found of sufficient dignity and simplicity to serve as dominating feature for that whole elevation, nor could the dis-symmetry of the plans be made to harmonize with the symmetrical roof; and yet the plans were entirely convenient, and the roof just what was wanted in the general effect. Obviously the Jardinier would have to be sobered up and compelled to think.

A continuous arcade across the lower story was found to be satisfactory, and the windows of the upper story were, without regard to their natural relations, grouped symmetrically if not formally, above them. The addition of buttresses, while not logical, nor in any way related to interior bearing-walls, was found to be very helpful to the effect. Sincerity in design is always desirable, but cannot, with success, be made a fetish, and here the suggestion of end-pavilions, obtained by the superposition of windows framed between practically meaningless buttresses, brought a solution which has seemed entirely satisfying.

For the rest, the house, as has been said, depends for its exterior effect on texture and color. Rubble-stone walls mixed with brick, and drifting off above into stucco, through which the brick and stone still occasionally protrude, give that charm of premeditated spontaneity which Anthony Hope once attributed to his heroine's golden hair. The stone was carefully selected for flat surfaces and warm rust-colors, the brick is rich and varied, and the roof-slate is also largely yellows and browns. The treatment of the stucco is probably unique, being hand-colored with the infinite labor of love. It was originally intended to be buff and of varied texture, but during the enforced absence of the architect it hatched out blue-grey and smooth. So the architect bought him a variety of water-proof paints, some tin dishes to mix them in, a dozen or more sponges, a paint-brush or two, and borrowed extension-ladders and canvas overalls. Then during three weeks he labored,

Stair Hall

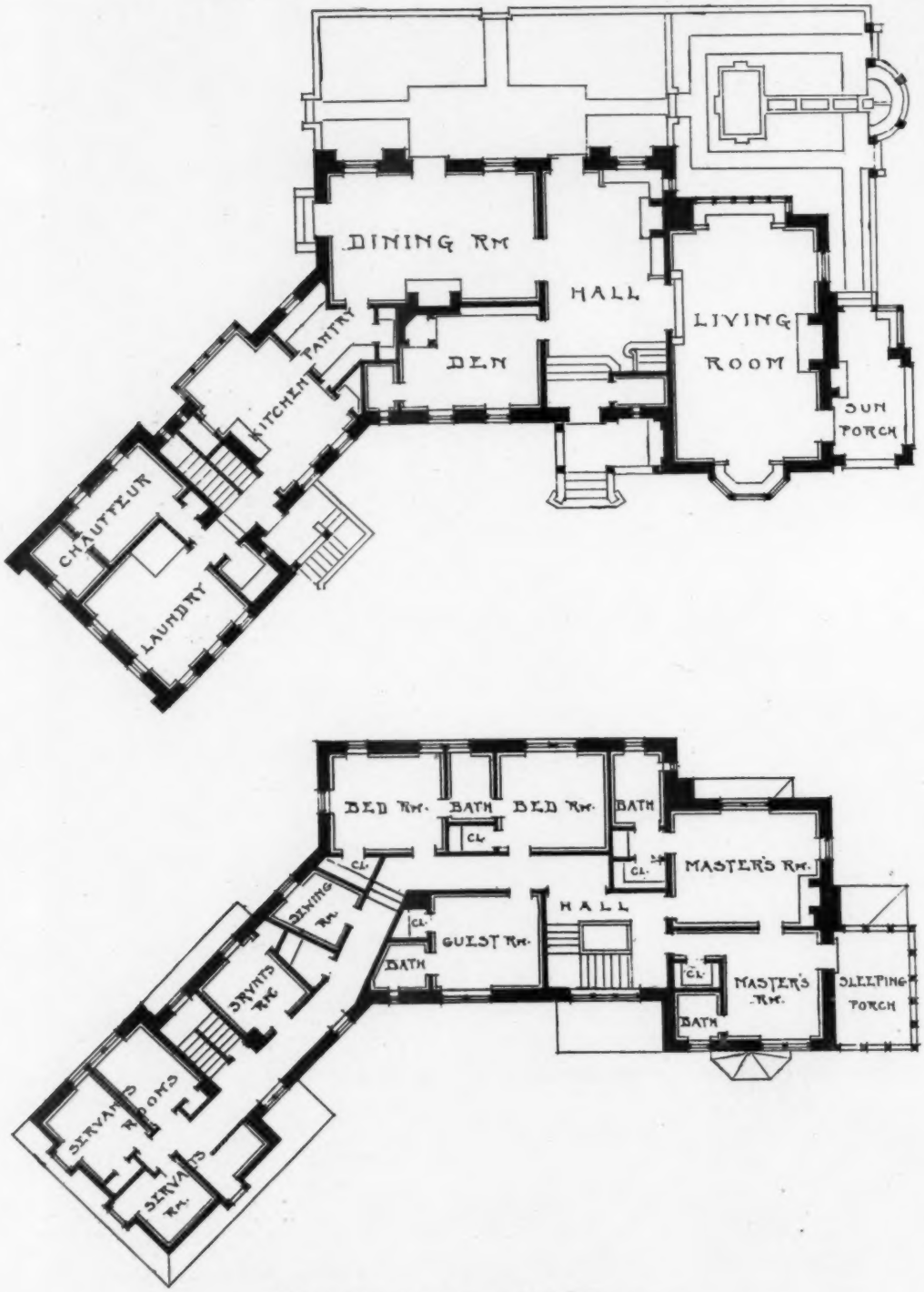


SOUTH ELEVATION, MAIN PORTION

HOUSE OF E. A. CHOATE, ESQ., RYE, N. Y.

W. K. RAINSFORD, ARCHITECT

XUM



HOUSE OF E. A. CHOATE, ESQ., RYE, N. Y.

W. K. RAINSFORD, ARCHITECT

SERVICE WING, NORTH ELEVATION

SUNKEN GARDEN

HOUSE OF E. A. CHOATE, ESQ., RYE, N. Y.

W. K. RAINSFORD, ARCHITECT

XUM

DINING ROOM AND DEN FROM STAIR HALL

HOUSE OF E. A. CHOATE, ESQ.
RYE, NEW YORK

W. K. RAINSFORD, ARCHITECT

DINING ROOM FROM STAIR HALL

developing style and a technique in this unprobed field of art, and eventually felt proud of his work. The first panel, executed on the tree-covered East front of the garage, was christened "The Battle of the Marne," then came "The Ashes of Empire" and "The Gotterdamerung." But round the corner, on the more public North front came a well-ordered Turner sunset, and thereafter he settled into his stride. The final result is not glaring; it is not bizarre; it is only warm, and varied, and very personal. There are orange-browns drifting down into buffs, and brownish orange slightly shot with crimson, where the bricks give a red background, and the rough texture of the stucco would allow a dry brush to leave a delicate bloom of color on the tops of the roughness alone. For the most part, the work was done with a sponge, sometimes containing different colors on its opposite sides. Sometimes the sheer blue of the stucco could be coaxed into an olive-green, which might be carried off into cinnamon or partly overlaid with a thin cloud of old-gold; on the South front, where the stucco was already yellowish, much of it could be left to show through, and here, where the house is viewed at more intimate range, the coloring was kept very subdued. As an indication of the spirit in which the work was pursued one might note that the owner took two days from his business in the city to act as painter's-assistant, and color the stone-joints to match.

The care taken in the exact placing of the house, so as to fit it in between the well-grown oak trees, helped out by some successful planting of cedars and laurel about the front door, has been well repaid by a prevention of that feeling of rawness so commonly associated with the very new. The house seems to grow from the ground on which it stands and to have been there for decades. The interior will require both time and money for its proper furnishing, but here the owner must take up the work where the architect leaves off, and the labor of love may be leisurely continued for all time.

STAINED GLASS PANEL
IN METROPOLITAN
MUSEUM OF ART

GERMAN
MIDDLE XVI CENTURY
RENAISSANCE

SOME FUNDAMENTALS IN HOSPITAL PLANNING--PART II

BY HENRY C. WRIGHT, Hospital Consultant

Airing Balconies and Sun Porches

SUN and air are very important therapeutic agents. No hospital should be without an abundance of both. The open balcony is used for fresh air treatment. The porches with windows are heated. They are used most largely by convalescent patients. Patients, whether in a ward or private room, need a change, and an enclosed porch affords a place of diversion and assembly. Such balconies and porches, so far as possible, should not be so placed as to darken wards or patients' rooms. Some hospitals have provided a narrow balcony about five feet wide along private rooms, with a door from each room onto the balcony. The bed can be pushed part way out. These narrow balconies do not materially darken the rooms below. In practice, however, they do not seem satisfactory. For high class private rooms, a private balcony is highly desirable. This can be formed partly by a bow window and recess between two rooms, and accessible from both. In large hospitals a smoking room for ward patients is desirable.

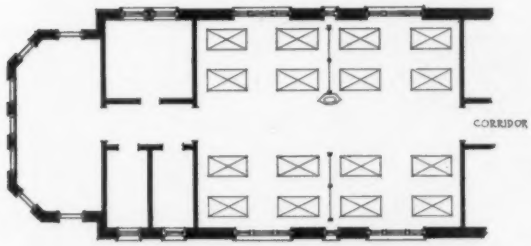


Fig. 3. A ward with beds parallel to the longitudinal axis. Plate glass screens separate the beds into groups of four. Wide windows permit adequate ventilation without a draft to any patient. Patients may be classified in groups of four. By this arrangement of beds, it is feasible to provide running water into the wards

Wards

A WARD is usually considered a room in which four or more beds are placed. Wards are usually used for patients who can pay little or nothing for care in the hospital. From the standpoint of the welfare of the patients, wards should contain few beds; from the standpoint of operating economy, as many beds should be in one room as can be readily supervised by one head nurse. The maximum should not exceed twenty-four. A desirable number is much less. In small hospitals the number of beds in a ward will be governed largely by the number of wards. In no case should there be fewer than three; one for females, one for males, one for babies. Preferably the males should be divided into surgical and medical. Again, it is desirable to provide a separate ward for maternity cases. Large hospitals will have additional classifications.

The objection to having a large number of beds in a ward may be minimized by grouping the beds and using glass partitions between the groups. See Fig. 3.

The arrangement of beds as shown in Fig. 3 has the additional advantage of abundant ventilation without a draught on any patient. Again, no patient faces the light. This arrangement of beds is used in the new Cumberland Street Hospital, Brooklyn, New York.

The width of wards should be not less than twenty-six feet and not more than twenty-eight, when the beds stand at right angles to the longitudinal axis. When they run parallel, as in the foregoing illustration, the width should be not less than thirty-two feet.

Private Rooms

PRIVATE rooms may be of great variety in size and facilities according to the finances of the hospital and the class of patients to be cared for. The simplest room may be eight by twelve feet, with no running water or closet. These dimensions require the bed to stand at right angles to the outer wall. It is preferable to have the bed parallel with the outer wall. With this arrangement the minimum width of room is about nine feet. Ten feet are preferable. Thirteen feet is a comfortable length for a room. A room eleven by thirteen feet is very convenient to work in, and more desirable for a patient. Rooms in higher class hospitals are frequently made twelve by fifteen feet. A semi-private room usually contains two or three beds, preferably separated by a curtain or a permanent partition of sheet metal and glass. For these beds, a width of seven feet is workable; eight feet are preferable.

All private rooms if possible should have running water. When finances will permit, it is desirable to have rooms in pairs with a toilet between assigned to either of the rooms. Where this arrangement is used the lavatory should not be placed in the toilet, but instead, one should be provided in each room. See Fig. 4. The following arrangement is desirable:

Private baths are little used by patients. Nevertheless it is desirable to provide some rooms with baths, since they are requested, and will bring proportionately larger returns to the hospital.

The doors to private rooms should be not less than three feet six inches; four feet are preferable. When finances will warrant, metal frames should be used. The doors should be so hung as to shield the bed when partly open.

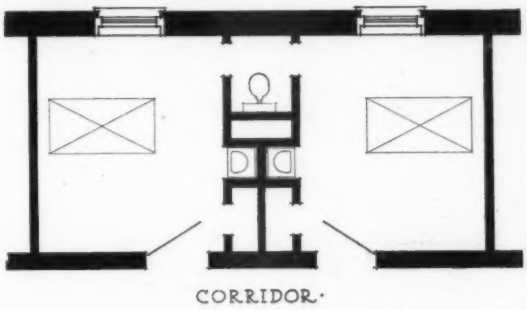


Fig. 4. Illustration of a toilet located between two private rooms, accessible from either, with a lavatory placed in each room so that running water will be available in the room not having the assignment of the toilet. Door from the corridor to the private room so hung as to screen the bed

Service and Auxiliary Rooms

IN addition to the food service room heretofore mentioned, each ward or group of private rooms should have a utility room, nurses' station, bath and toilet, examining room, quiet rooms, place for clean linen and for soiled linen, stretchers and wheel chairs closets, and, for the surgical ward, a place for dressing carriages. When feasible, a case for flowers should be provided.

A utility room usually is equipped with a sink, laundry tray, bed pan hopper, utensil sterilizer, instrument sterilizer and gas plate. There should be floor space for a table and waste receptacle. In this room are frequently placed the dressing carriages and a case for solutions and supplies. In, or in the vicinity of this room should be a blanket warmer. It is desirable to have the nurses' toilet entered from this room. Herewith is presented an illustration of a utility room.

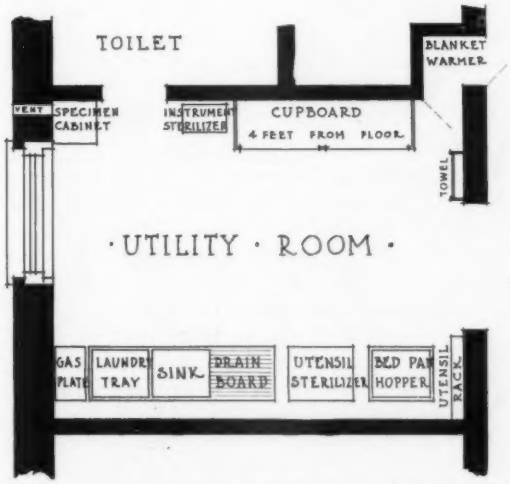


Fig. 5. Utility Room, showing necessary set fixtures. Blanket warmer so located that it can be used also as a utensil warmer

With wards, it is advisable to have the nurses' station adjoining, with a window overlooking the ward. In, or near this room or alcove should be the linen and medicine closet. This should have running water. In connection with private rooms, the nurses' station may be an open-front alcove in the rear of which is a linen room with shelves for linen, trays and other accessories.

Soiled linen may be placed in hampers or dropped down clothes chutes. There are objections to clothes chutes unless they are enclosed in a room and made accessible only to an employee

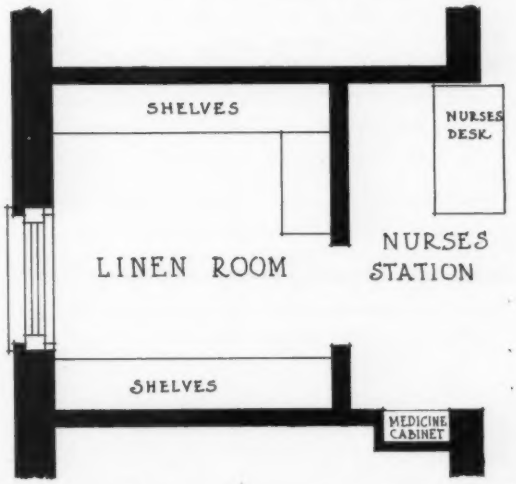


Fig. 6. A nurses' station and linen room so combined as to facilitate control of linen by the Charge Nurse

assigned to the task of putting the soiled linen in the chute. Unless this arrangement be made, the inside of the chute is likely to become fouled by the carelessness of employees.

In arranging the accessory and auxiliary rooms, study should be made so to place them as to reduce to a minimum the travel of nurses. The room most frequently visited in ministering to the patient should be nearest the ward. Where possible, it is advisable to have the toilet and utility rooms at the outer end of the ward, so that visitors will not pass by them.

Operating Room

THE minimum operating service is one operating room, a surgeon's dressing room and a room used jointly for sterilizing, nurses' work

room. An anæsthetic room is desirable, but this function can be performed in the operating room if space for such a room is not available. The surgeon must have a room in which to dress. If this room be adjacent to the operating room, his final wash-up may also take place in this room. So far as possible the operating suite should be so located that visitors or employees do not pass by the rooms.

In larger hospitals the operating facilities will be adjusted to the amount of work to be done. In addition to one or more major operating rooms, there should be one or more minor operating rooms. In these rooms a large proportion of operating may be performed, thus reducing the labor

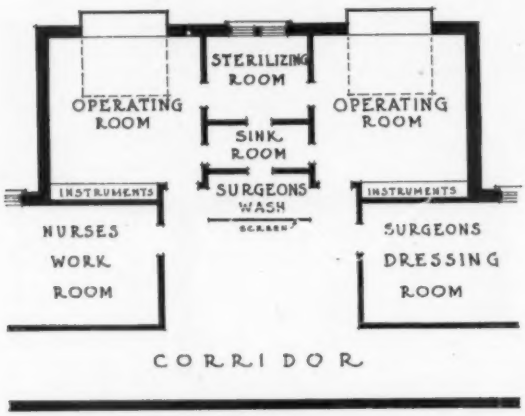


Fig. 7. A convenient layout for two operating rooms, with auxiliary rooms

of preparing and caring for the large operating rooms. Where possible set fixtures for washing instruments and for disposal should be in a room or space separate from the sterilizing room. If the nurses' work room be not adjoining the sterilizing room, it is advisable to have a dressing sterilizer in the nurses' work room. This room should also have a sink used in preparing saline solutions. The nurses' work room should have ample cupboards or cases in which to place material to be sterilized and having been sterilized.

The sterilizing room should have a water sterilizer, dressing sterilizer, if it be not in the nurses' work room, one or more instrument sterilizers, sink, and room for one or more tables. Adjacent should be a blanket warmer and saline closet. The blanket warmer may be used for this purpose.

The major operating room should be lighted from the North. It is advisable to place artificial lights above a glass ceiling, so that no pendant fixtures will be over the operating table. It is advisable to have no set fixtures in the operating room. A central floor drain is desirable, and electrical outlets on the walls needed. A hose connection for washing the room should be provided.

Delivery Room

A DELIVERY room should be provided separate from the operating room. Adjacent to this it is advisable to have one or more labor rooms. In the delivery room may be the wash-up for the obstetrician. There should also be an instrument sterilizer, a pack sink, and a disposal sink. Closets or cupboards for supplies should be ample. A blanket warmer is needed if the warmer connected with the operating room be not nearby.

Creche

A CRECHE or nursery for new born babies should be provided. This should be a well lighted room, and opening on it should be a babies' wash-up and a food preparation room. The creche need not be near the delivery room, but should be as near the maternity service as possible.

Floors

NO thoroughly satisfactory floor has as yet been devised. Tile is sanitary, easy to clean, has low upkeep, but is expensive and hard on the feet. Terrazzo is good, but will crack, and at times will roughen. Magnesite floors are easy to lay, cheap, but not durable. They will usually crack, and often peel up. Wood floors have cracks and require constant attention. Their daily care is expensive. Linoleum, if fully seasoned before laying, and then properly laid, is on the whole a very satisfactory floor for wards and rooms that do not have rough usage. For private rooms, wood or cork or a combination is very satisfactory. In corridors, cork, linoleum, rubber or terrazzo, are durable and acceptable. Kitchens and operating rooms should have tile floors.

Windows and Ventilation

ARTIFICIAL ventilation, except for operating rooms, kitchens and toilets, is a needless expense. Seldom are ventilating systems used, even though installed in private rooms and wards. It is better not to depend upon them. Window ventilation can be made satisfactory if the windows are properly designed.

Lighting Fixtures

NO ceiling fixtures should be used in wards or patients' rooms. It is difficult for a patient lying on his back to avoid the light from a ceiling fixture. Side fixtures are much preferable. At each bed should be a light-plug, for reading and to be used by physicians when examining patients.

Call Systems

IN small hospitals no call systems are needed. In a hospital of moderate size a call system for nurses is desirable, especially from private rooms. No call is needed for doctors. In large hospitals a doctors' call is necessary. Audible calls are disturbing to patients. Lights are preferable.

Stores and Storage

A STORE centralized and under the control of a storekeeper is advisable. Only daily supplies of food and materials should be issued, so no auxiliary store rooms should be provided. Storage space is very essential for broken furniture, mattresses, surplus beds, cots, and a great variety of things.

Laundry

IT is advisable for a hospital to have its own laundry. Much of its laundry is in such condition that a commercial laundry does not care to handle it. It is preferable to place the laundry in a building separate from the patients. The basement of the patients' building, however, is a feasible place, provided it be well ventilated. The equipment is very similar to that used in a commercial laundry. Separate washers for staff laundry are advisable.

Heat, Light and Ventilation

IF the hospital be not too large, hot water is preferable to steam, inasmuch as the radiators by that system are never hot enough to burn patients,—a factor which must be considered. When possible, it is advisable to place radiators under windows. A ventilating louvre through the outside wall, back of the radiator, necessitates enclosing the radiator. The enclosure harbors dirt. The enclosure may be obviated by bringing the window close to the floor.

In small hospitals it is advisable to place the heating plant in the basement. In large hospitals a separate building is preferable.

Light generated by a hospital plant is usually more reliable than that purchased from a commercial company. A breakdown generator is needed for safety.

The problem of refrigeration is complicated. What boxes should be refrigerated and what not; whether or not ice should be made, are questions for local determination. The size of the hospital and relative location of refrigerating machinery and boxes must be taken into consideration in deciding the question of manufacturing ice. Refrigeration of all boxes and the manufacture of ice are desirable if the cost is not too great.

Shops

AMPLE space should be set aside for shops, carpentry, painting, etc. Frequently too little attention is given to this phase of hospital operation.

Ambulances

SOME hospitals do and some do not operate ambulances. When ambulances are used, provision should be made for them as near the main building as feasible. Space for a shop and waiting room for the driver should be provided. Telephone connection will not be overlooked.

THE foregoing spaces and facilities are some of the most common and important in hospital planning. Spaces which are not common to all hospitals have not been discussed, such as the dispensary, Zander room, hydrotherapy, electrotherapy, cardiography, etc. Such spaces will be determined by a study of the local problem.

XUM

Old Providence National Bank

(See reproduction of original drawing by O. R. Eggers on opposite page)

THIS building was erected about 1775 by Joseph Brown, one of a number of competent "builder-architects" whose work may be found in all of the original states. Brown occupied it as a residence for a long period of years. It then became the banking house for the Providence National Bank.

This structure long stood as a symbol of the financial stability of the Government. It typified the various stages of the history of banking in this country from the time when the Continental Congress first gave aid to the banks organized under its authority through the many financial storms that culminated during our Civil War in the present National banking system.

Within and without, this building bears evidence of its having originally been designed for a residence. The many years of commercial occupancy did not rob it of its fine features of architectural detail.

OLD PROVIDENCE NATIONAL BANK
THE AMERICAN ARCHITECT Series of Early American Architecture

GARDEN WALL AND APPROACH

ESTATE OF ARTHUR H. MARKS, ESQ., YORKTOWN HEIGHTS, N. Y.

ANDREWS, RANTOUL & JONES, ARCHITECTS

XUM

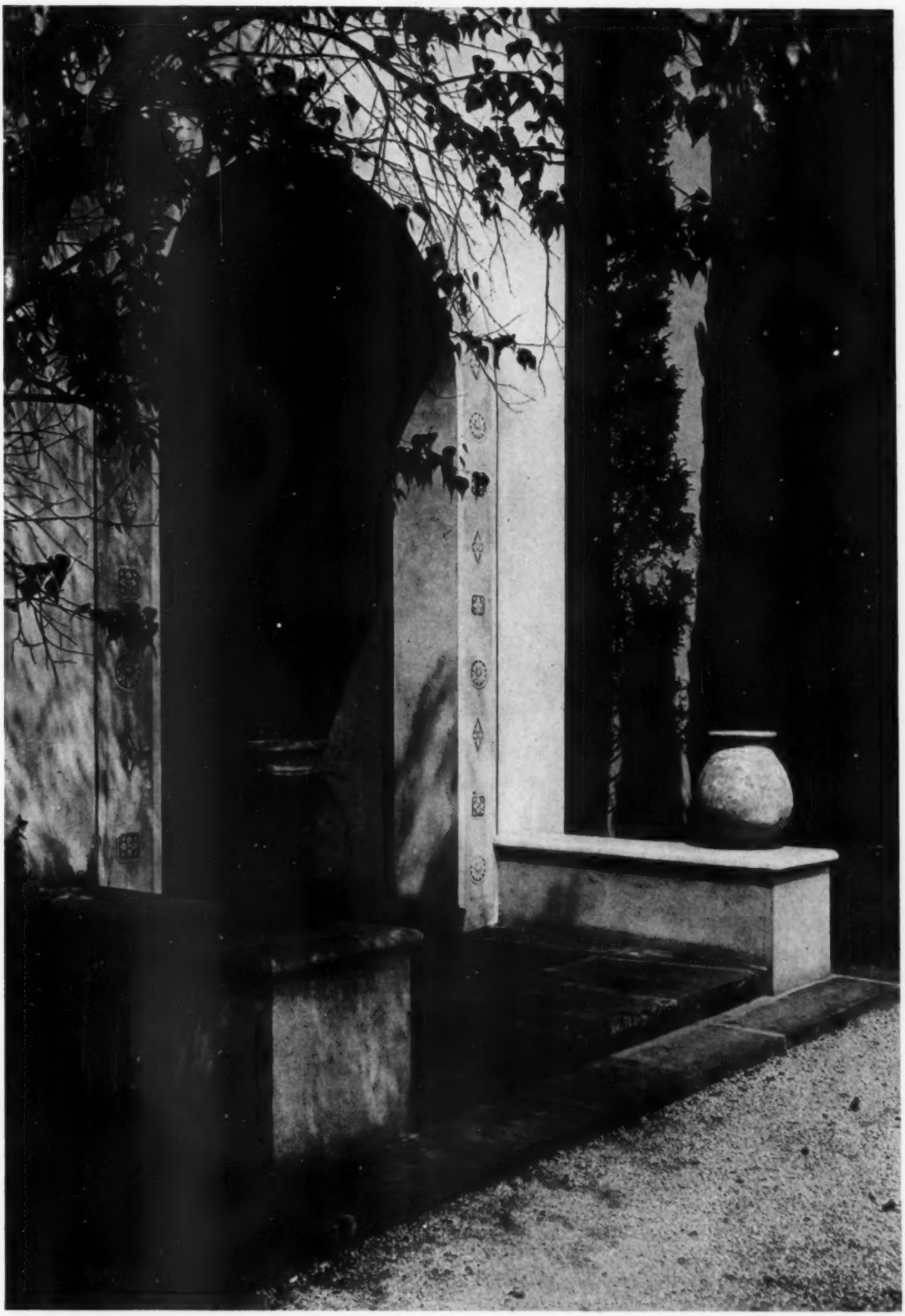
VIEW IN GARDEN, ESTATE OF ARTHUR H. MARKS, ESQ., YORKTOWN HEIGHTS, N. Y.
ANDREWS, RANTOUL & JONES, ARCHITECTS

GARDEN STEPS AND PERGOLA

HOUSE OF CHARLES A. STONE, ESQ., LOCUST VALLEY, L. I., N. Y.

WELLES BOSWORTH, ARCHITECT

XUM



ENTRANCE DETAIL

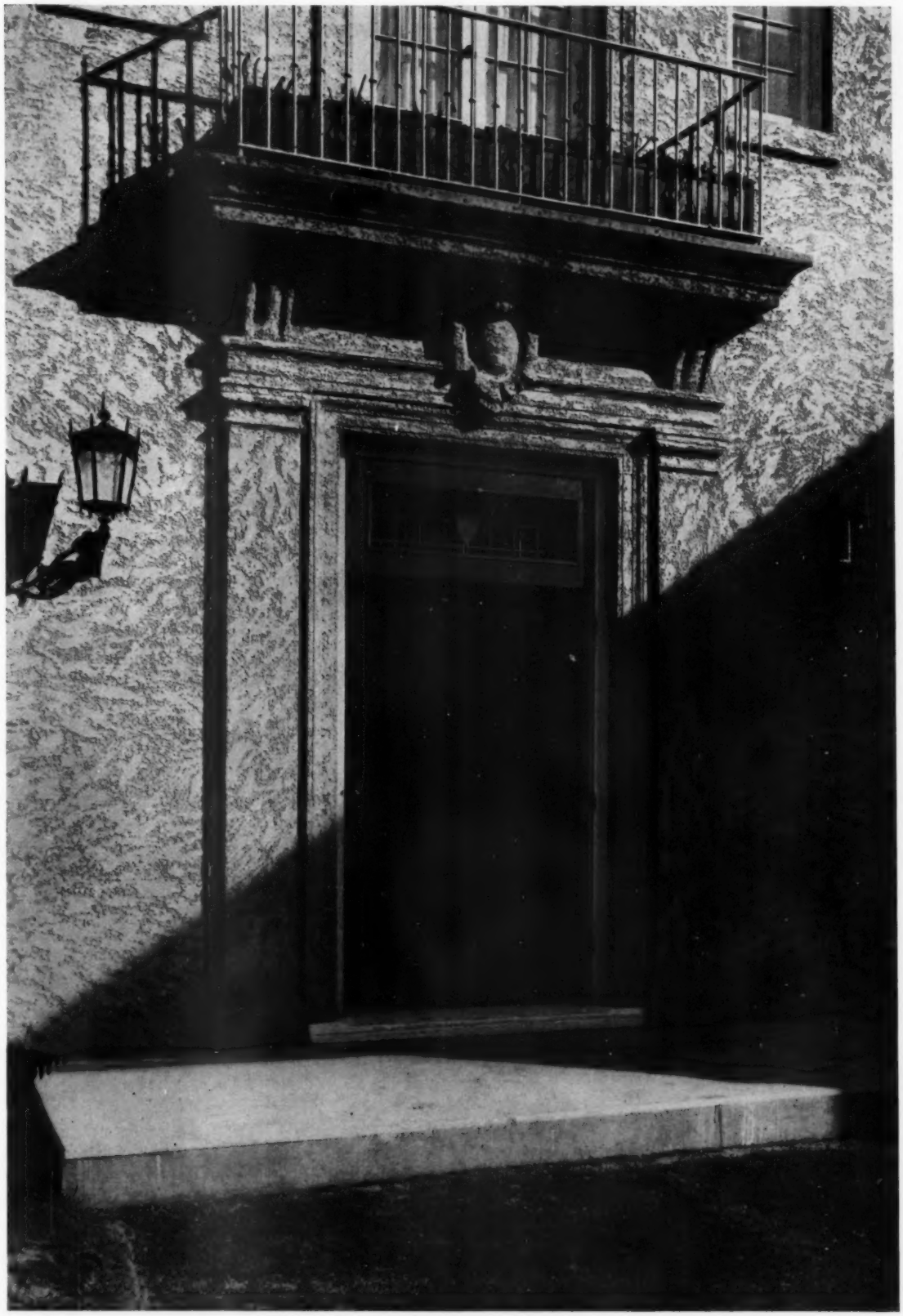
HOUSE OF CHARLES A. STONE, ESQ., LOCUST VALLEY, L. I., N. Y.

WELLES BOSWORTH, ARCHITECT

XUM

HOUSE OF A. E. BURR, ESQ., SCARSDALE, N. Y.

A. J. BODKER, ARCHITECT



MAIN ENTRANCE DETAIL

HOUSE OF A. E. BURR, ESQ., SCARSDALE, N. Y.

A. J. BODKER, ARCHITECT

XUM

ENTRANCE DETAIL

HOUSE OF A. E. BURR, ESQ., SCARSDALE, N. Y.

A. J. BODKER, ARCHITECT

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GARAGE OF A. E. BURR, ESQ., SCARSDALE, N. Y.

A. J. BODKER, ARCHITECT

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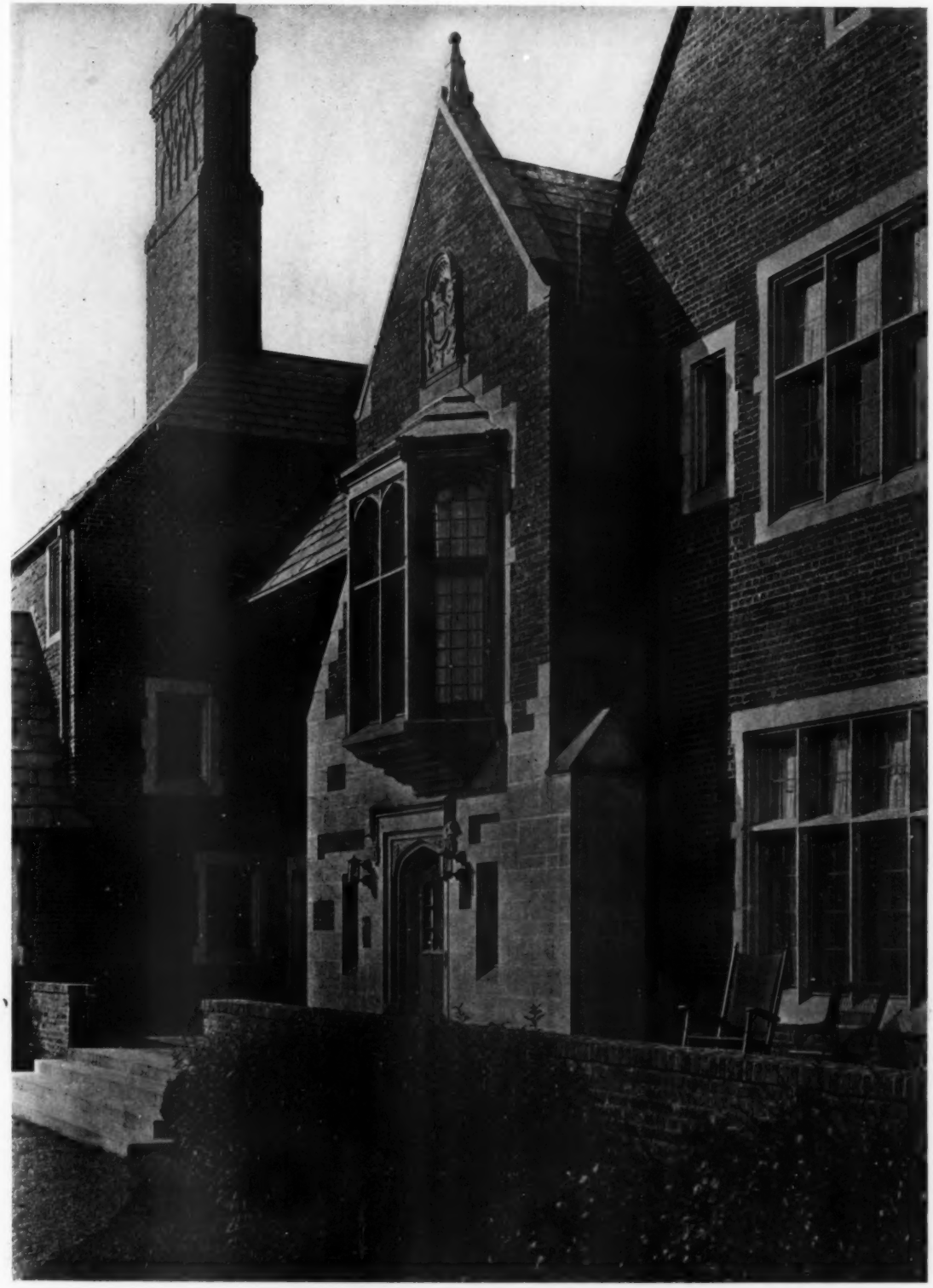


DETAIL, MAIN ENTRANCE

HOUSE OF W. D. PACKARD, CHAUTAUQUA, N. Y.

WARREN & WETMORE, ARCHITECTS

XUM

THE PORTE COCHERE

HOUSE OF NICHOLAS BRADY, ESQ., MANHASSET, L. I., N. Y.

JOHN T. WINDRIM, ARCHITECT

XUM

EXTERIOR DETAIL

HOUSE OF FRANCIS KEIL, ESQ., SCARSDALE, N. Y.

A. J. THOMAS, ARCHITECT

XUM

EXTERIOR DETAIL

HOUSE OF FRANCIS KEIL, ESQ., SCARSDALE, N. Y.

A. J. THOMAS, ARCHITECT

XUM

HOUSE OF PHILIP W. HENRY, ESQ., SCARBORO, N. Y.

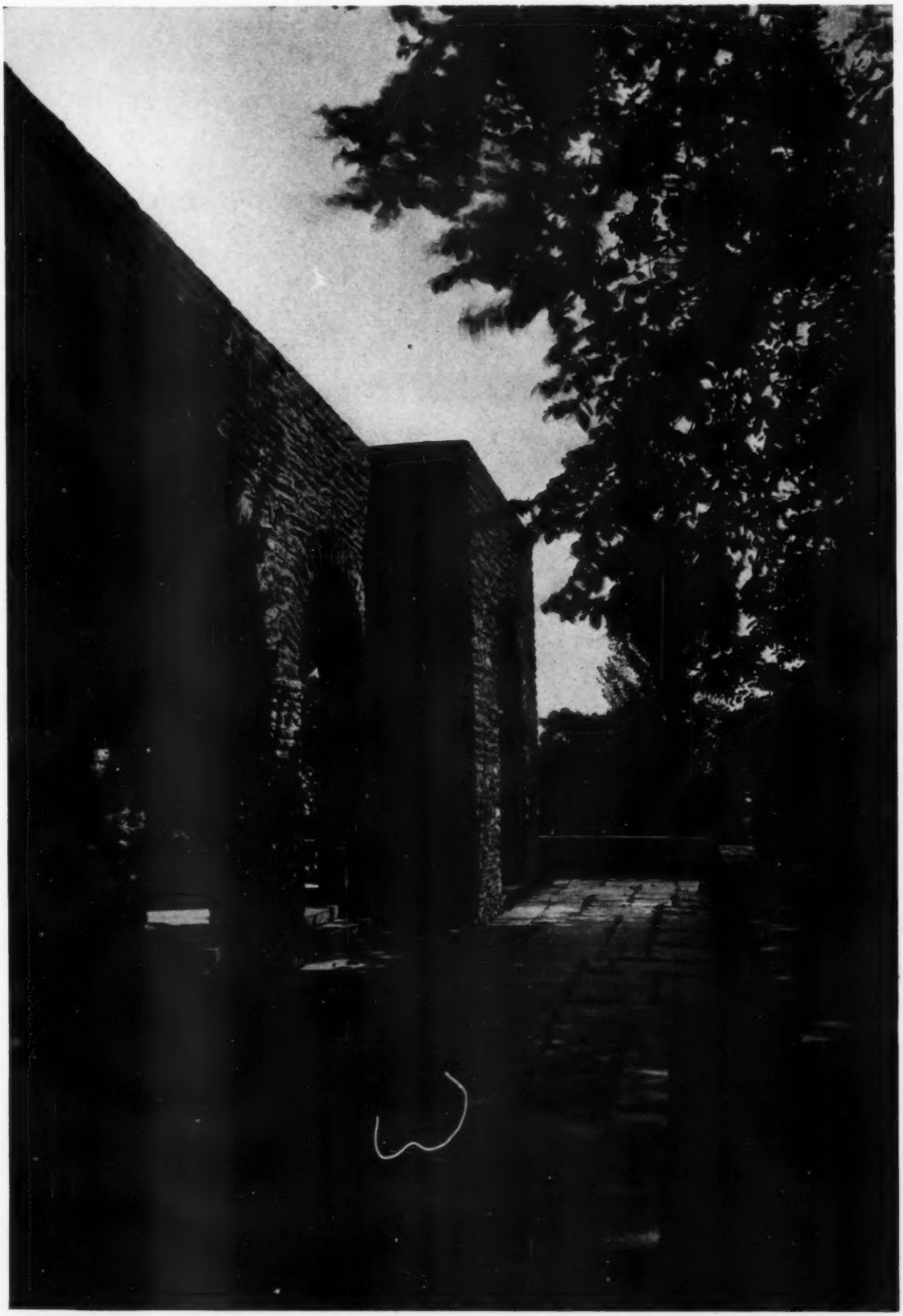
BERTRAM G. GOODHUE, ARCHITECT

DETAIL ON TERRACE

HOUSE OF PHILIP W. HENRY, ESQ., SCARBORO, N. Y.

BERTRAM G. GOODHUE, ARCHITECT

XUM



TERRACE VIEW

HOUSE OF PHILIP W. HENRY, ESQ., SCARBORO, N. Y.

BERTRAM G. GOODHUE, ARCHITECT

XUM

HOUSE OF PHILIP W. HENRY, ESQ., SCARBORO, N. Y.
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·EDITORIAL·COMMENT·

Bankers and Contractors

THE report that banks in Chicago will refuse to make building loans unless contractors agree to abide by the ruling of Judge Landis in the recent arbitration case between labor unions and the Employers' Association is a refreshing sign of sanity. The decision was widely acclaimed because it reduced rates of pay in the building trades. The more significant part, the elimination of practices calculated to enhance the cost of building by putting a premium on inefficiency and lack of speed of craftsmen and combinations in restraint of competition on the part of associations of employers, is now sharply emphasized by the reported action of the banks. The first reaction on many people is condemnation of the banks for what appears to be conspiracy. Sober second thought shows that the action is eminently proper. The refusal on the part of employers to abide by the decision is a confession of their unwillingness to conduct their affairs in a lawful manner.

To loan money to such men is contrary to public policy, for the lender in effect becomes party to a conspiracy in restraint of trade. Any citizen smarting under a sense of wrong or imbued with a crusading spirit in defense of public rights can stop work in progress and thus imperil the security on which the loan was made. The banks, we may be sure, are acting on good legal advice. Before the decision of Judge Landis was rendered no question could be raised, but a defiant attitude indicates a spirit of resistance to law and this spirit the banks cannot afford to recognize. Thus expediency and business morality march hand in hand, unless business morality is merely another name for expediency, a somewhat pessimistic opinion, it must be confessed, for one to hold.

New York Chapter Visits "Southern Cross"

THE visit of the New York Chapter, American Institute of Architects, to the Munson Line Steamship, Southern Cross, serves to direct attention to the rapid advancement of the architectural treatment of passenger-carrying ocean going steamships flying the American flag.

Up to the outbreak of the War, this country's proportion of passenger ocean ships was comparatively small. When the Shipping Board started out on its extensive program of ship building, they laid the keels of many ships, most of them for transport service. With wise forethought they planned for the conversion of a number of the larger ships to passenger service. When the Armistice was signed many of these were on the ways, not yet launched. The group of ships now operated under the American flag are of large tonnage, and their refitting to adapt them for passenger service was quickly and satisfactorily accomplished.

The Southern Cross is one of this group. Another ship, the Hawkeye State, of 20,800 tons' displacement, was fully described and illustrated in THE AMERICAN ARCHITECT, issue of April 13, 1921.

While the solution of the architectural problems presented in the conversion of these ships, has not, in every instance, been satisfactory, the great advance shown indicates the future possibilities.

If one is able to look back over a period of forty years, he will be convinced that much satisfactory work is being done in an effort to make these ships architecturally better.

Forty years ago, the ocean going passenger ship was, as to its equipment, a very unsatisfactory thing. The steamboats, plying on our large inland waters, were a most awful type of so-called architecture. Garish, overspread with jig-saw work and gilt, they suggested to the traveler afloat the usual ornate bar-rooms of the period. The ocean going ships followed these undesirable models.

But a few years before the clipper packets, the shuttles that wove the fabric of our communication with Europe, were making their lumbering way across the Western Ocean. The cabin passenger of that period, as far as comfort and convenience were served, was not as well off as the steerage passenger of today. It is marvelous to note what has been accomplished in the perfection of our "floating hotels." There is, as has been heretofore pointed out, an interesting field of work for architects in the architectural treatment of passenger ships, and undoubtedly every member of the New York Chapter who was of the party on the Southern Cross realizes the opportunity for a new and decidedly good field of study.

Poseurs

ARTISTS, real artists, those whose pictures hang on the line at Academy exhibitions, and for whose canvases dealers compete, will soon have no place to lay their heads.

Ten years ago, when Greenwich Village was a real art center, an artist might have secured a whole floor for forty dollars a month, or a single room at a proportionate rate. "The Village" was a real art center, a worth while place for artists to live. But, when they were comfortably settled

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there, when they had set up their easels and gone to work, along came the newly rich, the "near artist" and all the bunch that affect the artistic pose. They elbowed the artists to one side, and offered unheard of prices for studios.

A lot of people who absolutely were devoid of artistic perception, who could not even draw a straight line with a ruler, and whose ideas of art were of the department store type, moved their rugs, their old pewter and all the junk they fondly believed to be artistic, into the Village. Then they set out on a round of "studio teas," and scoured the Village for an artist "lion" as a guest of honor. Their finely engraved visiting cards proclaimed their studio habitat. Meanwhile other equally inartistic "artists" bought and remodelled old houses, the speculative real estate agent co-operated, and rents began to soar. Now the real artists are moving out, and the Village once truly called the "Latin Quarter of New York," is but the neighborhood of dilettante and poseurs.

These things are occurring in other cities, and are making conditions so very bad as to create a real hardship for the city living artist. As soon as he makes known that he wants the place for a studio, the owner scenting a large profit, raises the rent.

The parasites of art cannot know the contempt in which they are held by artists. If they did, they would not continue to crowd them out of house and home by aping a pose that they are absolutely unable to make good.

The Voice of the People

WHILE the general public may know nothing about art, in Boston at least it knows what it likes, or doesn't like. Judging by the letters printed in the daily press of that city, the people do not like the new building of Federal Reserve Bank.

It does not "symbolize the federal power of which it is a local embodiment." "It violates a fundamental principle of architecture in being out of harmony with the site." These are some of the transgressions that are said to be a part of the general architectural scheme of the building. Possibly these criticisms are not well founded, and we suspect they are not, but what is worth while directing attention to is that the people of Boston are jealous of their architectural good name, and are quick to voice their criticisms of what they don't like. It's a good rule for other cities to follow. If the building is as objectionable as claimed, the government has learned that dwellers in cities have certain rights as to the character of federal architecture that it will be wise to acknowledge. And if the people are wrong, they may be "shown" and thus acquire some much needed education in the art of architecture.

Architecture and Atmosphere

THE ARCHITECT, of London, reviewing the exhibition of American architecture, held in the galleries of the Royal Institute of British Architects states,—"It is easy to forget that America has an atmosphere comparable to Southern Europe in its clearness, a factor which renders it natural that her architects should carry out work which is comparable in its fineness of detail to that of Italy, but which could be often like a partly legible page of print, seen in a poor light if erected here."—This statement as to atmospheric conditions in the United States is only true as to certain localities. Our climate is as varied here as it is in Europe. Another variation and the attendant atmospheric conditions are the outstanding things that prevent the development of what may we call a "national" type. We may have regional types and in fact we already have very distinctive buildings in different regional locations. What probably retards the development of regional types more than anything else, is the standardization of materials especially those molded elements that are introduced into the façades of buildings. Molded Terra Cotta, imitations of cut stone, wrought iron, all the many things that are available today, are very often selected and used without regard to the atmospheric conditions that prevail.

Manifestly any ornament that may be standardized cannot be successfully used in identical patterns in Pittsburgh, New York, Chicago or the cities along the Southern California coast. Each has its very marked atmospheric characteristics. The critical observer at the last exhibition of The American Institute of Architects held in Washington, where photographs of buildings were shown from every section, found that the ornament used on buildings has become so standardized that there is practically little difference in any of the locations mentioned above.

The successful designer will carefully study the effect of climate on the "weathering" of his work. Architects have exerted the very best influence on materials and the wise manufacturer has always lent a listening ear to their suggestions. The matter of design of decoratively molded material may well receive careful consideration, such consideration as will take into account the action of the atmosphere, and the location of the use of the material.

Successful manufacturers of commodities in general use, know that they must cater to regional taste. Novelties made for a large sale in one section, are found to be not readily saleable in another. If the architect will be as critical in his selection of elements of design to fit his particular locality, manufacturers, always keen to co-operate will join readily in meeting his needs.

DEPARTMENT OF SPECIFICATIONS

Foundations

THE discussion in our last issue assumed that the excavation contractor's work under a separate contract system would include only the rough excavation, leaving trimming of banks and finished excavation for footings, etc., for inclusion in the foundation contractor's work.

The next sequential step in this series is the subject of foundations which will include all finished foundation work, shoring and underpinning of adjoining buildings, sheet piling to hold banks of excavations and the construction of foundations up to the grade lines for exterior or retaining walls and to the bases of interior columns.

This discussion generally will treat of construction for which concrete is used. The use of rubble stone or brick foundation walls is becoming less common than formerly for the reason that concrete can be installed more cheaply and at the same time presents a much neater appearance and in certain cases provides a much better foundation for waterproofing against surface water or hydrostatic pressure.

It is some times customary to make certain assumptions with respect to the bearing power of soils that may not be proper when the exact nature of the soil is revealed by the excavation, and it is usually in those cases where the architect has not made previous examination of the soils that it is advisable to conduct tests on the bearing power of the soils and this work naturally will be done upon completion of the general excavation and will probably only be done under the direction of the foundation contractor because he will be able to furnish the material for loading such as cement or coarse aggregate.

If the soil is to be tested the tests should be made on a soil surface of more than one square foot. Up to recent years it has been customary to make the tests on one square foot of soil but it seems to be the general concensus of engineers that the test load should be brought to bear on three or four square feet in order to eliminate the punching action that a bearing one foot square provides. The test should be made on the soil at about the level of the bottom of the lowest footing and should be made in a pit that is approximately the size of the footing of the apparatus. This is to provide for resistance against upheaval of the soil under testing load, the importance of which can be readily understood. The method of erecting gauges for regarding settlement should be described carefully and there should be requirements for readings to be taken at intervals frequent enough to record settlements of one quarter inch.

The load should be applied gradually until the designed load has been placed, at which time the loading should cease and measurements taken for at least twenty-four hours. In some cases it is customary to apply an additional load equal to fifty per cent of the designed load from twenty-four to thirty-six hours after the original load has been placed. Readings under this loading should extend over a period of two or three days and it is advisable to allow the load to remain for at least one week in order to observe the action over this length of time. The application of loads and their removal within twenty-four or forty-eight hours do not always indicate correctly the actual supporting power of the soil. The specifications should require careful recording of all readings even though settlement does not occur.

It is often possible to reach definite conclusions as to the bearing power of the soil through a study of material brought up in holes of small diameter which have been bored down to a level of at least twenty feet below the level of the bottom of the lowest footing. It is not necessary for the specification writer to make requirements for borings other than to give locations or state about how many holes are to be bored. Quite often, if a hole is bored at each corner of the lot, observations possible to obtain from these borings will be sufficient to indicate the exact nature of the soil.

In a previous issue this department made a suggestion with respect to the obtaining of specific data by a competent engineer and if this data has been obtained it is of course rather unusual to require the making of test loads on the soil or of boring test holes, but as this work has had to be done on some operations after the general excavation has been completed, it is proper that the specification writer should have this as a reminder in his outline.

SEVERAL of the standard text books on engineering structures have complete discussions of the various methods of making soil tests and the specification writer should make it a point to understand thoroughly the discussion of this study in at least one of the books.

There are certain occasions where it is necessary to carry finished excavations up to the adjoining buildings with the bottom of the excavations below the bottom of the footings of adjoining building foundations. If this is necessary it will, of course, demand consideration of the support and maintenance of such adjoining buildings in a stable condition pending the installation of the new foundations and their bracing by means of floor systems. Such conditions undoubtedly will have been determined prior to the making of the drawings but it is only in rare

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cases that the drawings for a new structure indicate methods that are to be pursued in shoring or underpinning of adjoining structures especially where there are different owners. The specification writer should ascertain the conditions so that the contractor estimating on the contract will have a fairly clear understanding of the work that must be done in order to install the new construction work in an advantageous and economical manner.

As discussed heretofore a question of legal rights enters into the support of adjoining structures. If the law of the community requires that the owner of the new building provide underpinning for adjoining structures, these requirements will, of course, demand consideration. The specifications should require that adjoining structures be shored, needled if necessary, and underpinned in such a manner as not to interfere with the occupancy of the adjoining structure any more than is absolutely necessary and so that the building levels will be maintained in their original positions at all times. The specification writer should not attempt to lay down rules of procedure in respect to the kinds of shoring or needling media as long as he requires that the building be maintained in its original and in a stable condition. The contractor knows what results are to be accomplished and it will be his concern to accomplish them in the safest and, what is to him, the most economical manner. The above will cover practically all requirements that will be necessary in the usual operation but additional requirements may present themselves for consideration under unusual conditions. The specification writer then will have to consider what demands these unusual conditions make and arrive at some conclusion, possibly after consultation with contractors who are experienced in such work, and lay down a tentative course of procedure in outline form. Many valuable suggestions are given in engineering text-books and the information presented therein will, in practically all cases, provide the specification writer with sufficient information to handle his part of the work in a careful manner.

Cases will arise where sheet piling will be required, the driving of which must be done before the banks of the excavation are trimmed and possibly before the excavation work is commenced. Such requirements are usually the result of shifting soils such as quick sand or water saturated loam and sometimes clay on steep pitched hard pan, or gravel in similar stratification, will require the retaining of adjacent ground so that the foundations of buildings some distance away from the property line will not be endangered. It must be remembered that as a general rule where there is water present in the soils it must not be removed from the adjoining ground to such an extent as to endanger the stability of buildings nearby. This rule applies to all soils and is based on a general law that a property owner can excavate on his own property but he must not disturb the soil of adjoining property through his excavation work. In such cases restraining of soil must be accomplished by means of sheet piling. For a long time wood piles, that is planks, were used, but in recent years the economy and desirability of the use of steel sheet piles has given them a great deal of prominence in such work. Wood sheet piles are sufficient in soils that are not saturated with water or where excavations do not extend below adjoining foundations. In many buildings, especially where there are two stories below the grade line, the use of steel sheet piling becomes economical because of its strength. Shores must be erected to maintain the sheet piling in alignment and so as not to permit bulging under the natural pressure of the overlying soil. The piles should extend below the lowest trench excavation for the outside wall footings and should be placed so as not to interfere with the construction of the footings or foundation walls.

IN practically all building construction a specification writer is concerned more with the proper construction of the foundation walls and with the prevention of slides that might add extra expense or cause damage to adjoining structures or street pavements. If the specification simply requires that sheet piling of wood or steel, as the case may be, shall be provided to hold the banks of excavations, and shall be braced by shoring in such a way as not to interfere with the bracing of foundation walls his purpose ordinarily will be accomplished. Other phases of sheet piling are more properly engineering phases with which the specification writer should be familiar but which need not be written into the specification.

The drainage of excavations must be provided for in the specifications even though local custom indicates that the contractor will take care of such drainage regardless of specific requirements. If the site has been occupied by a building it is very probable that a sewer line will be available into which the surface water may be discharged by pumps. Otherwise, it must be conveyed to the ground surface and distributed into gutters or disposed of by other means to preclude its return to the excavation. This is one of the matters that usually is considered a routine duty of the contractor but, as mentioned above, it should be specifically included in order that there will be no dispute as to whether rain water or seepage of rain water or other surface—or ground-water is to be disposed of by the contractor. There have been some disputes as to whether under the usual specification requiring the contractor to dispose of all water in excavations he is required to

dispose of water resulting from excessively heavy rain-falls. The specification writer should bear this in mind and see that his clauses are so specific that there will be no question on this score.

In the specifications for finished excavation work it must be definitely stated whether or not the contractor will be permitted to trim the banks of enclosing walls and of trenches so that they may be used as forms for concrete. In many operations there is no reason why the concrete should not be laid against the banks, thus requiring forms for the inner wall surfaces only. In cases where membraneous waterproofing must be applied, this of course will not be possible and the specification then will require that excavations be carried to a point a sufficient distance outside the exterior foundation wall surface to permit the installation of such work. This will occur only in clay soils or soils of such homogeneity that they need no restraint such as that provided by sheet piles.

Much argument has been the result of this important point and it should be given consideration in every specification. There is usually no reason why the sides of trenches should not be used for concrete forms unless of course the soil is of such nature that such use cannot be made of it. If there is any doubt in the mind of the specification writer he should require that all excavations must extend far enough to permit erection of forms for the foundation walls and footings.

All excavated material must of course be removed from the excavation unless it will be of use in filling under raised portions of the basement floor. If the soil is not to be distributed over the surrounding ground for filling low spots or for general grading it must be removed to dumps and the specification must be clear on either phase of this question of disposal. All excavations must be carried down to the underside of the basement floor or to the underside of sand or cinder or other sub-grading that is to be provided under the basement floors. The specification writer should require that various levels be conformed to with as great accuracy as possible and be definite in stating that the excavations below such restricted grades will require the use of a certain kind of filling that must be placed at his expense.

If the site has been filled with rubbish, as is often the case, it will sometimes be found that good soil cannot be gained at the designed footing levels. In such cases the excavation work must be carried deeper and in order that the specification writer will provide all possible protection, he should include a clause calling for bids on the cost of excavation below the designed levels, these bids to be based on the cubic foot or cubic yard and to be computed from areas excavated and not from the amount of earth measured after it has been removed.

IN illustration of these points the writer has in mind one operation that revealed conditions that could not have been determined except by means of the boring of test holes. In making drawings for a building occupying an interior lot, careful inquiry was made of the architects and contractors who erected buildings occupying adjoining lots and each person interviewed claimed that the soil at the foundation level was good and that no difficulty was encountered in excavating the basement. In view of these reports it did not seem necessary to make test borings as the footing loads were comparatively low. However, during excavation work it was discovered that the soil was of a most treacherous nature and it was necessary to excavate to approximately twice the depth before firm and substantial soil was encountered. This condition resulted in a very careful investigation when it was found that a slough at one time passed through this property exactly at right angles to the street and as its banks were practically vertical and at the property lines, the adjoining building owners did not discover the rubbish and waste fill that was placed in the slough years before. On this operation the specification did not call for bids on additional excavation and the architect was justified in believing that the contractor succumbed to the temptation to make all the money he possibly could under the unfortunate conditions obtaining.

In further illustration of these points, in another operation the contractor claimed that his contract called for excavation at so much a cubic yard and for hauling away at so much a cubic yard, the amount of excavation to be determined from the hole dug in the ground while the amount of material that was to be hauled away should be determined in the wagons. This meant that there was an excess of about forty per cent in yardage to be hauled and because of the inadequate specifications the extra expense had to be adjusted practically in accordance with the demands of the contractor.

The specification writer, in case there are doubts as to the exact nature of the soil, should call for bids on excavation in soil that it is believed is present and also for excavating and hauling away soil that he believes might possibly be present. As mentioned heretofore, great care must be taken in identifying the soils that are commonly included in rock classifications such as shales and hard pans, in addition to what is ordinarily called "rock."

(To Be Continued).

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DEPARTMENT OF ARCHITECTURAL ENGINEERING

FUNDAMENTALS OF ECONOMICAL PLUMBING

Being Suggestions Made in June, 1921, to Secretary Hoover's National Building Code Committee in the Interest of the Betterment of the Housing Situation

BY WM. PAUL GERHARD, C. E., Dr. Eng.*

SUGGESTIONS tending to future economy in plumbing construction may be conveniently dealt with under the following headings:

I. Materials
II. Methods and Design
III. Workmanship
IV. Fixtures and Fittings
V. Control of Plumbing by Rules and Regulations

I. MATERIALS

(a) Cast Iron Pipe and Fittings

IN the construction of plumbing and house drainage systems by far the most common material used is cast iron soilpipe and fittings. At the present time manufacturers carry in stock, and plumbers use, three kinds and weights of pipe, namely light or so-called standard pipe, extra heavy cast iron soilpipe, and a medium grade of pipe. In most of the cities having plumbing regulations the use of light pipe is prohibited, and extra heavy pipe is specified to be used. A few cities, notably Philadelphia, permit the use of a medium grade of pipe. (4" soilpipe weighing 45 lbs. per 5-foot length.) In hundreds of smaller places having neither plumbing regulations nor inspections, plumbers still make use of the light weight pipe.

The standard or light weight iron pipe has been condemned for many years by sanitary engineering experts and by progressive plumbers as an entirely unsuitable material for the purpose.

It is obvious that if undesirable material such as this were eliminated entirely, manufacturers would have to carry a smaller variety of foundry patterns, as well as manufacture a smaller variety of pipes and fittings to be kept in stock. They would also benefit by a smaller demand for storage floor space in their warehouses. It is well known that there is a considerable loss by breakage of light pipe at the foundry, also loss from breakage during transportation, and finally loss due to breakage in delivery and handling on the job. All such losses could be done away with if the use of light pipe were prohibited altogether.

I favor formulating rules requiring the use of only *one* kind and weight of pipe and fittings. This pipe as well as the fittings to be somewhat lighter than the extra heavy pipe hitherto used. Such an amendment to existing rules could be effected without impairing the efficiency or durability of the constructed work. The medium-weight cast iron soilpipe used in the buildings of the United States Housing Corporation, at Bridgeport, Conn., seemed to be a well-made article; the pipe when cut was found to be uniform in thickness all along its circumference, and the joints of the pipe appeared to be well calked. They stood the water pressure test successfully.

There is no question that foundries and supply houses carry a larger variety of fittings than are required or desirable in use. Such a multiplicity of fittings appears to be quite unnecessary. The elimination of useless or seldom-used fittings would accomplish another economy. The War Industries Board reduced the number of available fittings from that shown in catalogs considerably, and with much success, and further improvement along this line could no doubt be effected.

All cast iron pipes and fittings should be delivered uncoated at the job. Coal tar or asphalt coating too often conceals foundry defects in the pipe. There would, however, be no objection to a red

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lead or other coating of the pipe system after same is installed in a building and tested.

I favor doing away with the so-called double-hub pipe, and making instead pipe in regular shorter lengths, beginning with one-foot pieces, two, three and four-foot pieces up to the standard length of five feet. This would effect some economy to the plumber on the work in not requiring the time-consuming cutting on the job of the 5-foot lengths of soilpipe.

(b) Welded Screw-Jointed Pipe and Fittings

STANDARD plumbing rules should recognize the fact that for large and particularly for tall buildings the screw-jointed drainage system has appreciable advantages. Hence both genuine wrought iron pipe and steel pipe should be permitted. Since galvanizing as a protection against corrosion in both kinds of pipes has been found to be of doubtful advantage, and certainly not of lasting quality, I favor, for house drainage purposes, the use of well asphalted pipe and fittings. The highest grade of welded scale-free steel pipe only should be specified, or else the somewhat more expensive, but apparently more durable, genuine wrought iron pipe. The use of the term "wrought pipe" should be discouraged or, better, prohibited as being a misnomer and misleading.

Fittings should be of cast iron, of proper weight, properly cast and tapped so as to constitute what is known as "recessed drainage" fittings, which insure a smooth interior to a pipe line.

For underground lines screw-jointed welded pipe should not be permitted, and only cast iron pipe of proper weight should be used. In certain cases it might be advantageous to use a heavier grade of pipe than that used for the vertical soil, waste and vent pipe system, such as, for instance, the cast iron pipe used for gas mains.

(c) Brass Pipe

PERMIT the use of brass pipe for drainage purposes, but only if the pipe is regular iron pipe size and semi-annealed. Owing to its high cost this pipe material will be but rarely called for, at least for the main soil, waste and vent stacks.

The use of hard brass pipe should not be permitted, and brass tubing, if used at all, should be restricted to the inlet side of fixtures and for flush pipes.

(d) Earthenware or So-called "Tile" Pipe

THE suggestion has been made time and again, and in fact, in some cities and towns permission has been given, to substitute tile pipe in place of iron pipe for the house drains *inside* of buildings. The controlling motive was stated to be increased economy.

Vitrified pipe has but two points of advantage over iron drain pipes: (1) the pipe in itself is cheaper; and (2) it resists corroding influences better than iron pipe. In the interest of a permanently safe house drainage system, however, these points should not receive much consideration.

As is well known, tile pipe is more fragile than iron pipe; it has less structural strength; it is more readily damaged. In designing a house drainage system the aim should always be to keep the house drain exposed as much as possible. This can be readily done with heavy iron drain pipe, which requires, when carried above the cellar floor, supports or hangers at intervals of about ten feet, whereas a tile drain should have continuous support. There is also the number of joints to be taken into account. In tile pipe there are on the average at least twice the number of joints that there are in iron pipe. Every joint in a drainage system being a danger point, the fewer joints there are, the safer will be the system.

In general, it is much more difficult to secure a good drainage layout with tile pipe. It should also be borne in mind that tile pipe is usually laid by masons or drain layers, rarely by plumbers; hence there would be two independent trades or craftsmen connected with the construction of a house drainage system, a thing obviously undesirable, because it introduces the question of divided responsibility for the work.

Again, it is well known that joints in tile pipe are more difficult to make tight; more precautions are required to prevent leakage of sewage from the joints. Such joints may be made tight by the aid of special "joint runners" and by the use of bituminous joint compounds, but all this would nullify the end desired, viz., economy in construction. When pressure tests are applied to tile pipes, joints found leaking are more difficult and expensive to make tight. To insure permanency, all tile pipes should be encased all around with at least four inches of concrete, all of which adds to the cost of tile pipe laying.

Summing up, my judgment is that tile pipe should never be used for house drainage *within* a building, and that if used with all the required precautions and with unusual care in workmanship, no economy whatever in construction would be attained.

Beginning at a point ten feet *outside* of the foundation walls of a building, tile pipe may be safely used, except that where there is danger of roots of trees growing into the pipe joints, or where the trench excavation is made in loose soil, and there is consequently danger of settlement, which would crack the pipe, or at least cause joints to open up, and also where a sewer line passes

near to a well furnishing water for household use, it is preferable to use the safer, though more expensive iron piping.

II. PLUMBING METHODS AND DESIGN

(a) Backventing versus Circuit Venting

PROGRESSIVE engineers and sanitarians have of late recognized the fact that there is room for a vast improvement in plumbing design, by the introduction of *simplified* methods, while at the same time maintaining the safety of the work. This would result in an appreciable economy in the cost of plumbing work.

The old, standard system of backventing individual traps, which entails the introduction of numerous and expensive, yet largely useless, branch vent pipes, must go. The simpler a plumbing system can be made, consistent with absolute safety, the better it will be. There are at the present time quite a number of cities and towns which have adopted rules permitting the use of anti-siphon traps at fixtures, always providing the main stacks of soil and vent and waste pipes are carried up full size through the roof, or providing the loop or circuit system is used.

For nearly twenty years all Government buildings in charge of the Supervising Architect of the Treasury Department have been designed with this greater simplicity in view. For an even longer period of time I have so designed the house drainage systems placed under my charge and superintendence, except where building departments stubbornly required the old obsolete system. Each year sees more cities adopting the safer and more economical methods.

I am inclined to believe the time is ripe for a universal introduction of the loop or continuous or circuit vent system. A recent legislative investigation in New York City brought out the fact that master plumbers as well as journeymen were opposed to the system and refused to estimate on work where anti-siphon traps were specified. It is not for me to say how far they were warranted in their action. It may well be that the amendments to the old plumbing rules appeared to them to be framed largely, if not altogether, in favor of one special trap device, and that their combined action resulted purely from the objection to the singling out of a special device which was not altogether free from faulty design.

In this connection mention should be made of the fact that two years ago, when the U. S. Housing Corporation appointed a committee of expert engineers to investigate and report upon a simplified plumbing system introduced by the Corporation from motives of economy, it was found by actual tests that a backvented plumbing system, erected according to the old rules, stood the severe tests less well than the simplified system using anti-siphon traps. Attention was, however, drawn in the report to the fact that all anti-siphon traps are to a certain extent more liable to fouling than the ordinary P- or U-shaped bend trap. Positive knowledge on this phase of the subject is still lacking, and it seems quite possible that the objections raised against anti-siphon traps because of fouling in the interior when long in use, may have been somewhat exaggerated.

While it seems proper to require the use of only approved and tested non-siphoning traps, the tests applied before approval of a trap should not be too severe, nor should they be formulated in the interest of only one special patented device.

While the recommendations of the report of the Committee of engineers appointed by the U. S. Housing Corporation were confined to plumbing in two- and three-story houses and to soilpipe stacks not exceeding a stated definite height, personally I entertain no doubt that a properly designed continuous vent system can be successfully applied to buildings up to ten stories in height. In fact, in my own practice, it has been introduced in a number of buildings without any complaints as to siphoning of traps ever having been made.

Any buildings exceeding ten stories in height, and in particular all skyscrapers, should be subject to a special examination, and their system designed accordingly, especially with a view toward avoiding backpressure in the system; but, in proportion to the vast number of dwellings and apartment houses required owing to the present housing shortage, they may be said to be so few that for the purpose of promulgating generally beneficial rules, which would tend to economy, they might be disregarded.

Possibly the solution of the problem may be found in a classification of buildings where anti-siphon traps could be safely used, and those in which they could not be so used without special precautions being taken. Plumbing rules, if modified, should state definitely under what conditions the simplified and more economical system could be used. The decision in this matter should not be left entirely to the discretionary power of a plumbing inspector, or a plumbing board, or a commissioner of health.

(b) Main House Drain Trap and Fresh Air Inlet

WHEN plumbing was first made subject to official rules and regulations, an essential requirement was the main house drain trap. This was largely the outcome of the sewer gas theory, which claimed that the air in the street sewers is deleterious to health and should therefore be kept out of the house pipe system. The trap in turn required the installation of a fresh air inlet, the object of which was to cause a circulation of air in the house pipe system. I was myself for many years an advocate of this main drain trap.

In recent years, however, scientific investigations have demonstrated the fact that the air in a house drainage system is more impure than that of the sewers. To a certain extent the trap is an obstacle to the free flow of the house sewage and at times it causes stoppages. Moreover, the fresh air inlet became an objectionable feature because of the difficulty in finding for it a proper location. The weight of evidence appears to be against the continued use of both the trap and the fresh air inlet, and in the interest of economy it would be well to dispense with them hereafter, except in certain specific cases.

(c) Trapping Several Adjoining Fixtures by One Trap

IN the interest of economy, and to simplify a plumbing system it has frequently been suggested to use a single trap for several adjoining fixtures, such as a basin and a bathtub, a kitchen sink and a washtub, or even for a battery of lavatories. I do not favor such a layout, even when more economical, and believe in the interest of safety and efficiency separate individual traps should be required in all cases.

(d) Use of 3-inch Soilpipes

WORTHWHILE economy can be effected in two and three-story houses by permitting the use of 3-inch (instead of 4-inch) soilpipe stacks. Where modern siphon and siphon-jet closets are used, having a somewhat restricted outlet, it seems perfectly safe to make this reduction in the size of the soilpipe stack, but the rule should be limited to houses with plumbing on only one or two floors, and should not be applied to apartment and tenement houses of many stories.

(e) Use of Flushometer Valves

SOME economy can probably be effected by using flushometer valves in place of high flushing tanks for water closets and urinals. But to avoid frequent repairs costly to building owners, and also in the interest of water waste prevention, only tested and reliable devices should be permitted, and these are notoriously few.

III. WORKMANSHIP

AT the present day, when lead pipe which has to be largely worked by hand, is to a great extent eliminated from plumbing work in buildings, there is apparently no good reason why a more mechanical execution, not only of the pipe system, but of the entire plumbing system should not be striven for. Long ago I pointed out that it was desirable to do away with slipshod methods and to introduce mechanically correct workmanship.

To an interested observer it must be apparent that the manual work of the journeyman plumber has not kept pace with the many improvements in the design of fixtures and fittings. A more accurate and more mechanical workmanship is required. This should be taught in the plumbing trade schools, and should be emphasized and required in the plumbing shops by the employers of labor.

It would seem to be entirely feasible and practical to lay out a plumbing system and fit it together in a workshop in much the same way as machinists turn out their work in erecting shops. If after being so fitted, the several parts are again taken down, transported to the building, and there again assembled, a more rapid and more accurate putting together could be accomplished, and this would undoubtedly tend to greater economy in the cost of an installation. This applies also to manufacturers and will be again referred to. How far the plumbers' trade unions would favor such a suggestion and departure from methods commonly employed remains to be seen.

IV. PLUMBING FIXTURES AND FITTINGS

OURS is undoubtedly an age of great extravagance, and as in the case of many other commodities bought by the public, extravagance in plumbing has led to the manufacturers displaying in their showrooms, and illustrating in their catalogs, a vast selection of elaborate and sometimes very expensive fixtures. A too large variety of fixtures and fittings is manufactured for architects, builders and owners of houses to choose from.

Economy demands that the number of types of fixtures should be restricted. A beginning should be made by abolishing entirely all fixtures and fittings which are either not strictly sanitary, or are actually unsanitary or are mechanically imperfect. In this category belong unsanitary bubble fountains, the secret basin waste valves, the short hopper and washout waterclosets, and water closets with local vent attachments, not required where the bathroom or the water closet compartment are provided, as they always should be, with proper ventilation. In this way restrict the types of fixtures to a few from which to make a selection.

Unrestricted variety of fixtures and fittings has a tendency to increase prices unduly, because it compels manufacturers and supply houses to keep a large stock on hand, which in turn requires storage space, patterns, working capital, etc. Manufacturers must admit that reducing the present confusing multiplicity of styles and applying standardization to those parts of fixtures, which connect with the water and waste system, would tend to a lowering of prices of their products, because overhead expenses would be considerably reduced.

In this connection I may refer to the Standard Specifications for Plumbing Fixtures, prepared by

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the Board on Uniform Plumbing Specifications for the U. S. Treasury, War and Navy Departments.

Greater uniformity and a smaller variety of styles would simplify and cheapen the cost of plumbing installations. But I would go a step further. I contend that it should not be necessary hereafter, when buying finished products from manufacturers to have them assembled and fitted, at great additional cost to the owner, on the job. The fittings selected should be properly assembled with the selected fixture at the manufacturing establishment, so that even should it be considered necessary—for greater safety and convenience in shipping—to take down and disconnect the fittings, the entire fixture, as illustrated in a plumbing catalog, could be re-assembled by the journeyman plumber in a few minutes instead of requiring hours and hours to do this at the expense of the owner.

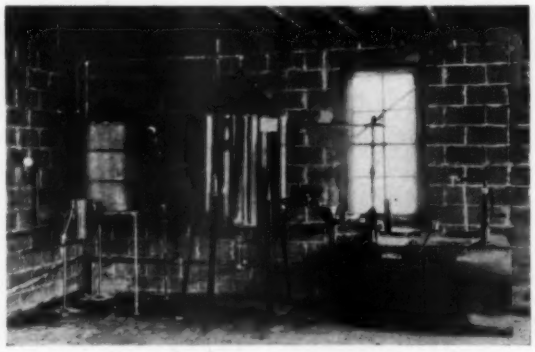
V. PLUMBING REGULATION BY OFFICIAL RULES

THE present rules—even the best of them—are burdened with non-essentials. These should be omitted in framing a standard set of rules. It ought to be possible to frame a compact set of rules, capable of universal application and providing for greater simplicity and safety, hence for economy. The rules should not permit of arbitrary interpretation on the part of the men appointed to enforce them.

There is some truth in the claim that present-day plumbing rules are responsible for the high cost of plumbing. But conditions like those referred to in preceding sections carry by far the greater responsibility. These have, without doubt, been seriously aggravated by trade and labor conditions as revealed in recent housing investigations.

NEW OIL FOR OLD

IN Fort Wayne, Ind., the Tarney Oil Company is a pioneer in a new industry, the reclaiming of crank case oil. The apparatus used is shown in the accompanying illustration. The company procures oil from garages, filling stations, repair shops, etc., and reclaims it for a certain charge per gallon. In cases where such an arrangement cannot be entered into the oil is bought outright, reclaimed and sold to dealers.



An oil reclaiming outfit for Garages

A business of this sort is of course local and may develop into public garage owners doing the work by regularly changing oil for motorists. The actual operating expense is barely five cents a gallon for the reclaimed product. Adding overhead and the slight loss in quantity there is still considerable economy in the use of reclaimed oil. The final saving is in the increased life of the motor, an important item.

Motor users can remember when manufacturers advised a change of motor oil every 600 to 1,200 miles and today, because of the heavy character of present fuel oil, it is deemed necessary to change oil every 300 to 800 miles. It is also true that most motor troubles arise from faulty lubrication due to the attempt of owners to keep down expense and change oil only when trouble develops. When it becomes possible for a motor driver to have a reasonable allowance made for used oil he will undoubtedly change oil oftener.

These reclaimers are new and designers of public garages, service stations and garages for taxicab companies, department stores, etc., might add "Oil Reclaimer" to specification reminders for garages. The outfits, we have been informed, are now standard for 50 and 100 gallon capacity per twenty-four hours and so may be installed in old as well as new garages. The 50 gallon outfit requires a floor space of 3 ft. 4 in. by 5 ft., with an over-all height of 6 ft. 11 in. The 100 gallon outfit requires a floor space of 4 ft. 6 in. by 6 ft., with an over-all height of 6 ft. 8 in. In addition a steam boiler is required if steam pressure is not available. Steam is used to rid the oil of gasoline, the principle being the same as a still. Other foreign matter is removed by precipitation, a coagulant being used to hasten the process.

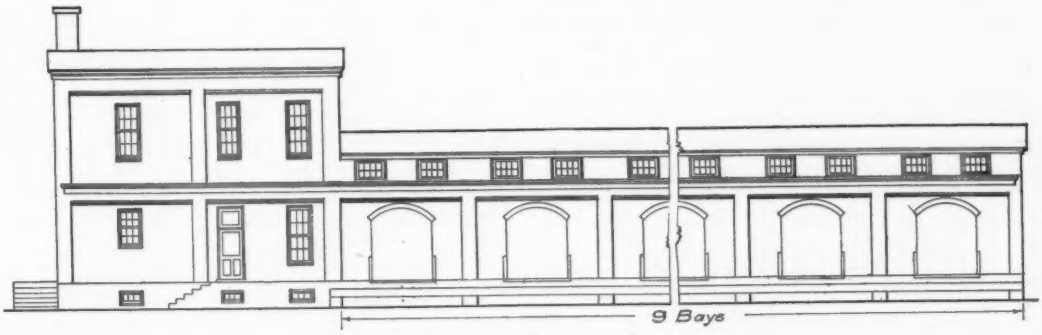
MODERNIZING RAILWAY FREIGHT HOUSES

BY G. P. RICHARDSON

GOOD lighting in a freight station eliminates dark aisles and gloomy corners, thus increasing the amount of usable floor space. It also facilitates the handling of freight because the tags and markings can be easily read. Standard designs for freight stations seem to have been prepared on the assumption that the structure was merely a loading and discharging platform having shelter walls and roof. A freight station really has three functions, being the platform mentioned, serving as a sorting room for shippers and, incidentally, doing duty as a temporary storage warehouse.

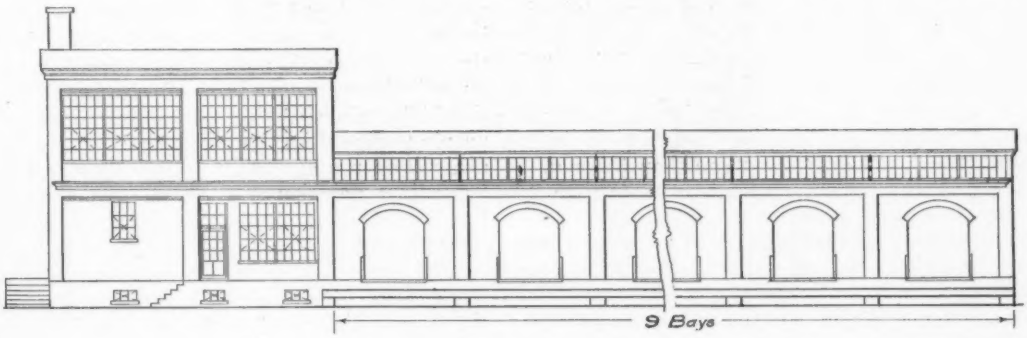
This modern conception of the freight station caused the engineers of a large railway company recently to make a careful investigation of their standard designs. The importance of good lighting and ventilation was appreciated but as the platform design was satisfactory the study involved merely the question of how to obtain better lighting and ventilation at the lowest cost.

The standard plans had been used in the building of a number of freight stations. All windows had small lights and wood sash. The accompanying illustration brings to mind the average gloomy freight station with an all pervading aroma of perspiring humanity and many sorts of perishable commodities. In the offices the wall spaces were dark and uninviting and in the merchandise storage space were plenty of dark nooks. In the monitor the windows were single sash spaced about four feet apart with brick walls between. The window design provided 220 square feet of lighting area and 31 square feet of ventilating area on each side of the building.



The standard Freight House with wood sash

The building was redesigned with large bays of steel sash in the office and a continuous run of steel sash windows in the monitor. The revised design provides 790 square feet of lighting area and 62 square feet of ventilating area on each side of the building. The difference is reported by the engineers as, "an increase of 260 per cent



The standard Freight House with steel sash

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in lighting area and 100 per cent in ventilating area."

The total cost was slightly reduced for the extra windows eliminated equal areas of brick wall, which cost more per square foot than the steel sash glazed. But one objection was raised and that was because the extra glass area may increase heating costs. The additional heating however will be required during only five months in the year and it is in these months that good lighting is essential. The better window lighting will reduce the expense of artificial lighting and also produce greater efficiency because of comfortable working conditions. One further improvement is under consideration, namely, the use of a light diffusing glass in the offices. The forward march of improvement is going to convert dreary freight houses and their offices into places where human beings may work with satisfaction, if not pleasure.

Specification for Spar Varnish

AN interdepartmental committee on standardization of paint specifications, United States Government prepared and recommended a specification for water-resisting spar varnish, which appears in Circular No. 103, of the Bureau of Standards.

In general the varnish shall be suitable for use on both outside and inside surfaces of vessels, buildings, etc., and must be resistant to air light and water. The manufacturer is given wide latitude in the selection of raw materials and processes of manufacture, so that he may produce a varnish of the highest quality. It must meet the following requirements:

APPEARANCE.—Clear and transparent.

COLOR.—Not darker than a solution of 3 g of potassium dichromate in 100 cc of pure sulphuric acid, specific gravity 1.84.

FLASH POINT (CLOSED-CUP).—Not below 30° C (85° F).

NONVOLATILE MATTER.—Not less than 40 per cent by weight.

SET TO TOUCH.—In not more than 5 hours.

DRY HARD AND TOUGH.—In not more than 24 hours.

WORKING PROPERTIES.—Varnish must have good brushing, flowing, covering, and leveling properties.

SAFETY OF WORKING.—Varnish must pass the draft test.

WATER RESISTANCE.—Dried film must withstand cold water for 18 hours and boiling water for 15 minutes without whitening or dulling.

TOUGHNESS.—Varnish must pass a 50 per cent Kauri reduction test at 24° C. (75° F.)

Detailed instructions for making the specified tests are given in the pamphlet which is sold by the Superintendent of Documents, Government Printing Office, Washington, D. C. at 5 cents per copy.

Entrances and Exits for Moving Picture Houses

IN a recent issue of *The Scientific American* appeared an illustrated description of a new device for assisting patrons to find seats in moving picture houses. Near the entrance a seating plan of the theatre is mounted on a stand, each seat being indicated by a round glass button. When a weight of not less than thirty pounds is upon any seat the glass button is illuminated. It becomes dark when the weight is removed. All that is necessary is for patrons entering the auditorium to look over the seating diagram for dark spots and then go directly to the seats thus indicated.

The recent fire in a moving picture house in New Haven, Conn., with attendant loss of life, has revived an idea worthy of attention. It is that every fifteenth row of seats be omitted, thus providing cross aisles in auditoriums. In the aisles going toward the curtain gates to be installed opening one way so the audience may go freely into the theatre but on going out will be checked and compelled to use the cross aisles. Fire exits to be opposite the cross aisles and to be open for use at all times. In this way the entrance will serve solely as an entrance, the only means of egress being by side doors, commonly known as fire exits.

Fire drills in schools, and other institutions where discipline is maintained, have proven their value. An alarm of fire sets certain formations automatically in motion so that panic may be, and generally is, avoided. A theatre fire however always causes a panic because the tendency of the audience lacking drill and discipline, is to escape by way of the entrance. The mind acting instinctively causes each person in a crowd to move towards the customary place of egress. Advantage should be taken of this mental reaction to train people to depart by the nearest exit, by making it difficult to use any other. Each moving picture house is a neighborhood center, the majority of the patrons being quite regular in attendance, consequently a short period of training will remove three-fourths of the danger of panic in case of fire. Such training will do away also with clogging of aisles and vestibules caused by people going in and out by the front entrance. The flow in and out should be in one general direction. Men who advocate such "routing" of theatre audiences believe it should be applied to all places of public assemblage, not excepting churches. That a structure is classed as "fire-proof," or "fire-resisting," is not in their opinion any reason for omitting the training for it is intended as a protection against danger of panic from any cause.

Architectural Engineering

Its True Meaning as Expressed by a Celebrated English Architect

DURING the course of an address on the Faults of Modern Architecture, delivered at a meeting of the Northern Architectural Association, at Newcastle, England, Professor A. E. Richardson, F.R.I.B.A., said, in part, as follows:

"I have reserved the subject of Architectural Engineering to the last not because I believe it to be the least important but by reason of the fact that it is largely out of architectural hands. This in itself is one of the most lamentable things I have to bring to your notice. Oddly enough, the giant conceptions produced by engineers during the past forty years have the merit of scale, due, of course, to the objects they express; they have the merits of proportion, but there the good qualities end. It is pathetic to come across an engineer's attempt to make a building or an erection, be it of steel, masonry or humble brick, a thing of character. What the engineer lacks the architect possesses; there you have the case in a nutshell. The pity of it is that the two seldom collaborate, and until this misunderstanding of the functions of each is overcome no real progress will be made. Some of the factories of the North of England, some of the power houses in the South, exhibit features that are distinctly pleasant, not, let it be understood, by reason of architectural embellishment, but on account of massed form which is in the main accidental. Artists, mostly futurists, look upon such works as typifying modern life, but even if such accidental things are passable they are far from the true meaning of architecture. As direct statements of fact they may be admirable, but we are as unlikely to advance the spirit of architecture from such concrete evidence as we are to obtain inspiration from the ruins of Karnak."

BOOK NOTES

The Writing of Specifications*

THERE is such a dearth of good books on specifications that when one receives a new book on this interesting subject it is welcomed with a hope that at last some one has produced a book that covers the subject, even though it be elementary.

"The Elements of Specification Writing" has thirteen chapters the subjects of which are: Introduction; Contract and Bond; Advertisement (or Notice To Contractors) and Information To Bidders; Proposal; The Composition of Specifications; General Clauses—Specifications and Plans; General Clauses—The Engineer During Construction; General Clauses—The Contractor and His Workmen; General Clauses—The Contractors Miscellaneous Responsibilities; General Clauses—Progress of Work; General Clauses—Terms of Payment; Specific Clauses; Outlines of Specific Clauses and an Appendix consisting of five pages.

The discussions of the assigned subjects are interesting and instructive, as far as they go, and should be of some assistance to students in molding their judgment on the legal provisions and entanglements of engineering work.

The few pages that are devoted to specific clauses, outlines and the appendix, as elements of specifications, contain material of value. The reference to the difficulties in correctly naming different soils is easily worth the price of the book and for this reason if for no other, should be read by all architects.

It is regrettable, however, that books on specifications devote from three-fourths to nine-tenths of their contents to discussions and instructions pertaining to general conditions of contracts and instructions to bidders and leave the impression that specifications for materials, methods of finishing and installation and for equipment are so inconsequential that they do not need elucidation.

An architect has at his disposal the Contract Documents of The American Institute of Architects and, until he is able to compose better general conditions, he should adopt them for his work. It is true that one should know something of contract law but, for the average architect, it will suffice if he writes his specifications so carefully that actions at law are not necessary to maintain the rights of the parties to the contract.

It is certain that an *architect* cannot learn very much about the elements of specification writing from this book and possibly he can learn a great deal more about legal entanglements from other books that are more comprehensively written.

One cannot help but sympathize with the student who, while in school, is given such inadequate instruction in the elements of writing specifications for all trades from excavation to interior decoration and lighting fixtures. For when he attempts to write his first document he will find he has been fed shells and not kernels.

* *The Elements of Specification Writing. By Richard Shelton Kirby, C.E. New York, John Wiley & Sons, Inc.* 153 *pp.* 6x9 *in. Cloth.* $1.50.

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THE AMERICAN SPECIFICATION INSTITUTE

127 North Dearborn Street, Chicago.
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ANNUAL FALL CONFERENCE

THE first Annual Fall Conference was held at the Chicago Engineers' Club on the evening of December 9. The attendance was very gratifying, particularly as there was representation from practically all interests involved in building construction work. It was the concensus of those present that similar meetings should be held at least once every two months and in accordance with this wish the Board of Governors has determined to hold the first "Annual Winter Conference" in the first part of February, next year. At future conferences one particular subject will be discussed by several speakers from different viewpoints so that discussions may be prepared in advance.

After the dinner the meeting was conducted by Mr. Chester L. Post, in the absence of the Chairman of the Board of Governors, Mr. Ralph W. Yardley.

The following letter from Mr. Yardley was read:

"It is a great regret to me that I shall be unable to be present at the first Annual Fall Meeting of The American Specification Institute.

"Since leaving Chicago and during the extended tour of the west and south which has enabled me to be in many cities, I have interviewed many prominent engineers, architects, manufacturers and contractors, and I have yet to find the first who did not feel, as do those who formed the organization, the inefficiency of the average specification in use today for all classes of engineering and construction work, and the need of improvement.

"I feel that those who attend the Fall meeting are to be commended for their interest and activity in furthering the interests of the allied professions through their interest in improving specifications, and I feel sure that everyone who attends that meeting will leave it with a desire to interest other members of his profession because of the value to him of the work of the Institute.

"It has been my privilege to see the engineering, architectural and technical man from all angles. I have lived with him as a student in the university. I have taught with him as a teacher preparing others to enter a technical professional career. I have been the technical man in his office handling the affairs of his clients. I have advised municipalities in their selection of technical service and had the assistance of the technical man of nearly every profession during the World War. I have represented the interests of corporations where I was practically the client. And therefore I believe that I have the right to state that there is no commercial business, and few professions, which have the splendid aim to be constantly on the aggressive to seize and do those things which will advance the profession as the professions which comprise the various activities represented by the membership of the Institute. A famous physician once said that the medical profession was the only one which was striving to put itself out of existence. The architectural and engineering professions are the only ones which strive to improve constantly the work which they do, and which endeavor to protect and secure for their clients the best and most modern results for the least cost, to the detriment of the fees which they secure as the remuneration for their services.

"I realize that the view of remuneration for services of the technical man and the commercial man is based on two ideas, assuming we are referring to the money remuneration. To the professional man money is a reward. It furnishes a means of livelihood,—to be sure,—but to him his profession is first and all. The work of his profession is a fascination and a pleasure. The improvement of his professional work is the same as his physical, mental and moral growth, and the money which he receives is the incidental reward for his labors which will result in proportion as he grows in his profession and as he gets more and more interested in his profession. With the man engaged in pursuits other than those of a technical profession, the viewpoint is entirely different. Money is the tool by which he accomplishes and secures and wields power. The

business he creates or handles cannot be shaped without it. It is the means to an end and not the result of a project.

"If we all did not have this love of our professions first and foremost and if our sole concern was the acquiring of money we would not be in our various professions today, for no man is or ever has been a success in his profession who went into it for purely mercenary motives.

"Therefore your presence here indicates a desire to improve the standard of your profession, to remedy a defect in your profession which has needed to be remedied for some time, but whose accomplishment seemed so great a task that no one had the courage to attempt it. And because it indicates this it is an evidence of your contribution to your profession rather than of any mere desire to meet your fellow members socially or to absorb a certain amount of data from the reports and papers which will be presented.

"I desire this talk to be brief and will not touch on matters which may be brought to your attention by others. As we are all interested in what we need to do, what we can do and what we will do in the coming year, there is no need of discussing the past or discussing at length the history of the Institute. Some years hence, when we are much older and when our year book is the standard handbook which lies at every specification writer's elbow, it may be amusing or interesting to the then youngsters of the Institute to have some of you tell of the inception of the organization, but we have not time for history now—there is too much work to be done.

"The need of the organization has been so thoroughly discussed and is so evident that I believe any time spent on such a subject would be a waste. As to the future, the Plan and Scope of the Institute, (which by the way, is about as brief, clear and definite a specification as has ever been written) is so comprehensive that it provides activities for a long time to come, and it is largely a matter of your selection of those things in the Plan and Scope which are the most important to you and which should be taken up first, which determine the most successful results for the coming year.

"In conclusion I want to mention two points which have been impressed on me most strongly since getting deeply into the work of the Institute. First, I desire to call your attention to the need of the professional man who is working practically alone in the smaller cities and towns remote from our great business centers. Those of us who have lived all of our lives in the great cities, who have belonged to the Engineers clubs, the chapters of the various Engineering, Architectural and other technical societies and who fraternize daily with others of our profession sometimes are inclined to make light of the man working in the smaller community, owing to the work of his hand not bearing the marks of the very latest technical and professional developments, as does the work of those in our great cities. But we should never forget that the improvement of the kind of work done in the profession, not only in the great cities, but throughout the entire country and the entire civilized world is of more importance to the profession and to each of us individually as a member of our profession than mere individual accomplishment, and that our contribution of our efforts and achievements to the profession at large is of greater individual benefit than any effort at or results from purely individual achievement.

"Second, we must try to realize the loneliness and isolation of the professional man working in the smaller and more remote communities. If you were to meet them as your Chairman has done, and hear them sincerely and earnestly explain their efforts to give their clients the best and latest developments of professional service, and hear them state their feeling that they were handicapped in so doing, owing to their working alone and apart from any professional contact, save the limited information obtainable through the technical press; if you were to hear their wish that the poorest part of professional service, the specifications, be developed so that they would at least approach the uniformly high standards which are set by drawings prepared in all offices everywhere, you would realize that the greatest service you can render to yourself and your profession is to give your fullest co-operation to the work of the Institute and to give it the advantage of everything you have learned and can in the future devise in connection with specification work.

"Your Board of Governors has earnestly and sincerely endeavored to give the best efforts they possess to make the work of the past year a success. The results have not been all it was desired they should be, altho they have probably been more than the members expected for the first year of as large a task as the Institute has attempted. They plan each year to endeavor to do more work than the preceding year, and they will spare no effort or hesitate at no sacrifice of personal time or personal convenience which may be necessary to make the work of the Institute a success.

"It is the desire of the Board of Governors that this Fall meeting be of such value that every member will be able to incorporate many of the items learned from the papers and discussion in his daily work, and it is desirable that everyone present take active part, not only in the meeting, but by correspondence with the secretary between meetings in order that the Institute may at all times be an active, working organization, daily assisting and helping the man whose work is that most complex and least understood of all tech-

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nical arts—the writing of practical specifications."

CHAIRMAN POST: It is very unfortunate that Mr. Yardley cannot be with us this evening, but we are mighty glad to have a communication from him in his absence.

The next thing we will take up will be the question of materials. Mr. Arnold of the Barber Asphalt Paving Company has kindly consented to discuss this question for us.

MR. ARNOLD: What I propose to say this evening covers the built-up roofing industry, or I might say, the materials going into built-up roofing construction. I don't think any one will dispute the fact that the built-up roofing industry, as an industry, is sadly in need of an airing and my object in the final analysis is to bring out the point that a few additions or slight changes in the average specification will enable architects and engineers to get the thing they want, regardless of what they might have decided to use.

I want to keep away from anything that might suggest that we want to bring out the relative merits of the materials available. I want to confine my remarks to the subject as a whole.

In the first place we have asked the question, "What is a built-up roof?" Now, regardless of where we may get the materials or who may sell them we are going to have to use two things—waterproofing and reinforcing factors. There are just three materials used that provide a waterproofing for a built-up roof: Trinidad Lake asphalt, a coal-tar residuum and a blown oil, so-called artificial oil residuum.

In the reinforcing field we have just three materials being used generally today. We have an all rag felt, which, by the way, is a cotton rag felt; we have a paper rag felt, containing various percentages of paper stock, and the asbestos compound felt.

Now, in the waterproofing group, taking one at a time, we have shown the derivation of the three materials. First we will take the artificial oil residuum. We get our crude oil in this country from six grand groups. It goes through the various pipe lines to the refiner. The refiners take out miscellaneous by-products such as benzine, gasoline, naphtha and so on, and when they get through with the material they have left what is a sludge; as a matter of fact, it is a fuel oil. That is placed in stills and under heat is blown or oxidized to make it of a proper penetration, or melting point, or consistency, for use in built-up roofing construction.

There is one other way that material can be used or compounded. It is possible to incorporate into the mixture a small percentage of gilsonite. That is done in some cases.

Briefly, that is the story of the oil residuum asphalt used in built-up roofing.

Now we will take the coal-tar group, and that, by the way, is a very interesting study. We get our coal-tar from the coke oven and gas plant. It goes to the refiners. They take out many by-products. When they get through with the material they have left a pitch or in some cases a coke. That in turn is fluxed back with dead oils to make a pitch used today for roofing purposes.

Now I might say there are two classes of pitch being furnished today for built-up roofing. A pitch as used in an ordinary, I will say in a less expensive, pitch and gravel roof, is of such consistency that it is necessary to flux the material with what is known as a refined tar, but, as a matter of fact, it is a flux and is absolutely necessary because, without its use, the pitch would be so brittle that it would be worthless on a roof.

Now the other type of pitch doesn't need the refined tar as a flux and, by the way, authorities claim that this flux, this refined tar, that is used in connection with pitch is a detriment rather than otherwise and tends to cause the pitch to disintegrate and go to pieces.

This happens to be the material that the Barber Asphalt Paving Company are interested in, the Trinidad Lake roofing asphalt. It comes from the Trinidad Lake in the British West Indies. It is brought to this country by boat where it is dehydrated and afterwards there is a small percentage of a liquid asphalt maltha added to make it of a proper consistency for use on a roof. There are no by-products taken from it, it goes to any producing company and directly to the roofing contractor.

The point I want to make, and I think this is the idea that is interesting the members, is that a classification of these materials is logical, regardless of what decision might be made as to which one of these materials would be used. If there is no other way in your minds, I would suggest that you classify the list as it stands. In other words, when a man wants to, or proposes to, furnish the Smith Co. or the Brown Co. roof, let's ask him what it is made out of. Maybe he has just the thing you want. That is the thought back of the idea of classification.

As I said before, there are just three reinforcing materials being used. We prepared a table showing the relative properties of those three reinforcing materials. We had to show relative properties because of the various weights. For example, the tensile, the Mullen strength and the percentage or limit in saturant of those materials would carry relatively. By the way, any of these materials are available from any number of sources; there isn't anything tied up with any particular organization.

All rag felt has the greatest tensile strength, next comes the paper felt and lastly the asbestos. The asbestos felt also carries the least in saturant.

Now briefly, that covers the subject of built-up roofing. That is all there is to it. Those are the

Residence of Francis A. Nelson, Architect, Upper Montclair, N. J. On the exterior, hand-hewn cypress shingles are used, stained with Old Virginia White. Roof stained with Cabot's Creosote Stains.

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materials available. How simple this whole thing could be made if architect and engineers would consider the subject of classification and demand to know what might be furnished under various trade names.

Just to illustrate how important this subject is from the standpoint of the architect: I have been informed, and I am absolutely satisfied this is authentic, that ninety per cent. of the tarred felt sold in the city of Chicago is No. 3 tarred felt for use in pitch and gravel roofing, yet I guess ninety-nine per cent. of the specifications call for No. 2. Now I am satisfied that that is a fact. How can we eliminate such gross misrepresentation, and how can we get away from those things? If the architect and engineer will incorporate in their specifications that felts (I don't care whose felts they may be) delivered to a job, must bear manufacturers' labels, denoting the kind of and weight per one hundred square feet, and insist if the labels are not on the material that they be rejected, we are going to get somewhere; at least we will take a step forward and eventually may eliminate this situation.

The same thing is true of waterproofing materials. As a matter of fact, I know that roofs are purchased in the city of Chicago and that the waterproofing used in those roofs is sold all the way at from six to fifteen cents a pound for identically the same materials. Now we wouldn't have such a condition if we just analyzed the situation as it is and it is not complicated.

Just one other thought: It is a pretty hard matter, in fact it is impossible, for a man in business to tell how many pounds of waterproofing material are being mopped on a roof in a mopping. It can't be done. Certain minima are possible in various materials, but, for example, when a man is specifying a pitch and gravel roof that is to be mopped, perhaps half the width of a lap, using approximately 100 or 125 pounds of compound, how in the world are we going to know that we are getting that many pounds of material? How much more simple it would be if we said, "mopping the lap eleven inches," or whatever the case might be, rather than using 100 or 125 pounds. The inspector always has a rule in his pocket that he can lay down and get it right.

Here is another thought: The reason this condition is here, and it is the same thing all over the country, is because a few contractors, unscrupulous, are trying to, or are, beating the system, and what is the result? When four or five contractors out of perhaps thirty or thirty-five decide to do business along those lines, the fellow who prefers to do business legitimately is either forced to get in line or get out of business and there isn't a legitimate contractor or manufacturer dealing in these materials but what would welcome an opportunity to put labels on and to assist in work of this kind, because it certainly is time that the built-up roofing industry is placed on an engineering basis and anything you gentlemen can do to help the cause will help yourselves and every one else interested.

(*To be Continued*)

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